Volume 2

Pages 113 - 300

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

BEFORE THE HONORABLE JACQUELINE SCOTT CORLEY, MAGISTRATE JUDGE

IN RE PACIFIC FERTILITY CENTER LITIGATION) **No. 18-1586 JSC**

San Francisco, California
Monday, May 24, 2021

TRANSCRIPT OF PROCEEDINGS

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Monday, May 24, 2021

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TRIAL EXHIBITS	IDEN	EVID	VOL.
528		207	2
531		207	2
532		207	2
533		207	2

Monday - May 24, 2021 **8:25 a.m.**

P R O C E E D I N G S

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(Proceedings held outside the presence of the jury:)

THE CLERK: Court is now in session.

THE COURT: Good morning.

MS. SHARP: Good morning.

MR. DUFFY: Good morning, Your Honor.

THE COURT: All right. So we will start right at 8:30.

MONIQUE WILSON: Who are you identified as? Because I don't even see a CRD option in the panel.

THE COURT: Monique, this is Judge Corley. We just have to start the trial now, so we are just going to have to -- we are just going to have to do it -- I don't have time. I'm not going to make the jury wait.

(Discussion held off the record.)

THE CLERK: Hello?

(Pause in proceedings.)

THE COURT: All right. Good morning, everyone.

MS. SHARP: Good morning, Your Honor.

MR. DUFFY: Good morning, Your Honor.

THE COURT: So the first -- so let's first talk about what we are going to do this morning.

When we bring the jury in, I'm going to read the

preliminary jury instructions.

At plaintiffs' request over defendant's objection, I struck the -- the contract language. As you know, I was inclined not to give any instructions about arbitration at all. So I will just strike that.

And I don't think -- I know Chart mentioned, well, the contracts will be in evidence. They will. But there won't be any discussion about the arbitration provision because it is irrelevant.

The second issue is the implicit bias instruction, which I am going to give. And I note that the judges in this district now have given it in several trials, and it was carefully created by the Minnesota courts after a comprehensive review process which included input from a variety of stakeholders, and not solely for the Chauvin trial, but for potential use more broadly instructing jurors to guard against their own implicit and unconscious bias. It's is not novel or unprecedented.

The Ninth Circuit's model civil jury instructions make express reference to unconscious biases. Many Courts, including this Court, regularly show introductory videos to prospective jurors in addressing the topic, including our jurors here today. They saw one upstairs.

The awareness of the phenomenon of unconscious, implicit bias is designed to enhance the quality of jury deliberations.

And the Minnesota instruction provides an accurate and substantive explanation of implicit bias and gives sound, concrete advice to jurors on how to safeguard against unconscious biases as they consider the evidence and deliberate.

And I will note, the language isn't based on one category or anything. It deals with gender, socioeconomic status, all sorts of things.

And when we bring jurors together from all different backgrounds, I think it is important. And the lawyers, too, come from -- and witnesses as well. So I'm going to overrule that objection and give that instruction.

So are there any -- so you got your tanks.

Oh, so in terms of schedule, I think what we will do is I will give my preliminary instructions. We will move straight to Plaintiffs' opening, and then maybe we will take our 10-minute break a little early so that Mr. Duffy can get set up. And then we will do Chart's opening, and then we will move straight to the first witness.

And are your clients here today?

MS. SHARP: Yes, they are, Your Honor. Three of them are here. Ms. Poynton, Ms. Enfield, and Ms. Sletten are here.

THE COURT: Good morning and welcome.

MS. SHARP: Your Honor, there is one issue that was raised with the Court last night regarding Juror Number 5. I'm

not sure if the Court has been briefed on this issue.

THE COURT: I have not.

MS. SHARP: We learned from Chart late last night that Juror Number 5, it has been disclosed by one of Chart's experts that there is a connection between Juror Number 5 and Mr. Parrington, Chart's expert.

Specifically, Mr. Parrington's brother attended and was the best man at Juror Number 5's wedding a few years ago.

This information was only revealed to us last night. And it became clear to us as we looked into it that Chart's witnesses were not identified in the questionnaire that was sent out to the jurors.

So what we would propose -- and we have met and conferred with Chart about it -- would be that we read the entire list of witnesses to the remaining jurors this morning just to make sure that we have a clean record on this.

THE COURT: Yes. So was that our mistake, that it just didn't get in the Survey Monkey?

MS. SHARP: Well, Your Honor, to be honest, we are not exactly sure. We provided -- all the Plaintiffs' witnesses were identified, and Chart's witnesses were not in the questionnaire. Not exactly sure how that happened.

THE COURT: Okay. All right.

MR. DUFFY: On behalf of Chart, I agree, Your Honor. I think we should read them again, just to make sure,

obviously.

THE COURT: All right. Number 5 then, since we know this, should we voir dire him?

MS. SHARP: Number 5?

THE COURT: Yes.

MS. SHARP: Sure, Your Honor. Although from our perspective, given the very close connection to this expert, we would have very significant concerns.

We would also note that had we known this in advance, had Chart actually provided the witness list to the jurors, we would have conducted our voir dire and peremptories differently. But we are where we are, and none of us want to lose this jury now.

THE COURT: All right. So I need this list.

MS. SHARP: We have it, Your Honor.

MR. DUFFY: All right.

(Pause in proceedings.)

MS. SHARP: May I approach, Your Honor?

THE COURT: Yes.

MR. DUFFY: Your Honor, in an abundance of caution, the list I think we filed has the anonymity names of the Plaintiffs.

MS. SHARP: Oh, yes. And Ms. Balassone's name is on there, Your Honor. We would note that we could skip her.

THE COURT: I wonder if I can just read the

defendants, since the Plaintiffs were on the survey.

MS. SHARP: That would be --

THE COURT: I don't know why.

MS. SHARP: Yes, Your Honor, that would be fine with us.

My colleague, Ms. Gliozzo, has a list of the witnesses who were not on the questionnaire list. Maybe that would be best.

THE COURT: All right. So I have the list in front of me, that you just handed to me. Just tell me where to start.

MS. SHARP: If I may approach again, here is the more streamlined list of those who were not identified.

THE COURT: Thank you.

MR. DUFFY: I will defer to the Court on this. I think it may make sense to read them all.

THE COURT: Why?

MR. DUFFY: We have already had one problem. I'm just worried. I will defer to the Court.

THE COURT: Well, you saw the survey. Is there any Plaintiffs' witness missing from the survey?

MR. DUFFY: I don't know, Your Honor.

MS. SHARP: No, Your Honor. We checked last night.

THE COURT: All right. Then I'm not going to read it again.

MS. SHARP: It was Chart who didn't read the names in the first place, so we would only have those names read. Thank

you.

THE COURT: All right. So all these names starting with Brendon Wade through Arun Sharma should be read?

MS. SHARP: Yes, I believe so, Your Honor.

THE COURT: All right. But maybe we should just speak to Mr. Hanson first; right? Because I don't want to bring them all out.

MS. SHARP: It is not Mr. Hanson, Your Honor. It is Ms. Fredrickson.

THE COURT: Oh, Ms. Fredrickson.

MR. DUFFY: No, no. It is Mr. Hanson. It is the best man. That's the one who knows one of our experts.

THE COURT: That's what you said at the beginning, I thought, Ms. Sharp.

MS. SHARP: Well, 5 was her number in selection.

MR. DUFFY: It is Mr. Hanson, correct.

MS. SHARP: Well, that is news to us.

MS. ZEMAN: Yes. We were told Juror Number 5.

MS. SHARP: The only way that you identified the juror last night was as Juror 5. We will check our records, but I believe Juror 5 is Ms. Fredrickson.

THE COURT: You are correct that Juror Number 5, in terms of number. But, I guess, letter E, I guess, is maybe what they were referring to.

MS. SHARP: Well, letters and numbers are different.

THE COURT: Right.

MS. SHARP: Your Honor, we would take the position at least that we should do voir dire on Mr. Hanson.

THE COURT: First, I guess.

MS. SHARP: Agreed.

MR. DUFFY: Agreed.

THE COURT: Ms. Means, can we bring in Mr. Hanson.

THE CLERK: Yes.

(Pause in proceedings.)

(Juror Hanson entered the courtroom.)

THE COURT: It is okay, Mr. Hanson. You haven't done anything wrong.

Good morning, Mr. Hanson.

JUROR HANSON: Good morning.

THE COURT: Thank you for being here this morning.

It has come to our attention the Survey Monkey that the jurors received was supposed to have listed all the potential witnesses in the case so you could see if you knew anyone.

It has come to our attention that the witnesses for Chart were not listed on that.

And it has also come to our attention that you may know one of the witnesses, Ron Parrington, who is going to be one of Chart's experts and is from Plymouth, Minnesota.

Does that name ring a bell to you?

JUROR HANSON: Yes.

THE COURT: And how do you know Mr. Parrington?

JUROR HANSON: I worked with him at Knolls Atomic Power Laboratory --

THE COURT: Could you speak into the microphone there?

JUROR HANSON: I worked with him at Knolls Atomic Power Laboratory in Schenectady, New York.

THE COURT: And for how long did you work with him?

JUROR HANSON: About five years.

THE COURT: And when was that?

JUROR HANSON: From about 1993 to 1998 or '99.

THE COURT: All right. So you are familiar, then, with his experience, just his scientific background, his education, knowledge. You have personal experience with that?

JUROR HANSON: Yes. I'm aware that he is a material science expert and a failure analysis expert.

THE COURT: Okay.

JUROR HANSON: If it is the same Ron Parrington I know.

THE COURT: It is, yeah, the same Ron Parrington.

JUROR HANSON: It has been a long, long time.

THE COURT: Yeah, no. I understand.

Does -- do -- do the parties have any questions for him?

MS. SHARP: I do actually, if I may.

THE COURT: If you could, into the microphone.

MS. SHARP: Of course. Apologies. Good morning,

Mr. Hanson.

JUROR HANSON: Good morning.

MS. SHARP: We received information last night that we would like to ask you just a little bit about.

We understand that you may have attended a wedding or that Mr. Parrington's brother may have attended a wedding related to your family. Does that ring a bell?

JUROR HANSON: Yes, Ron Parrington's brother is Joe Parrington. And he was the best man at my wedding.

MS. SHARP: At your wedding?

THE COURT: His brother was the best man at your wedding?

JUROR HANSON: Joe is a very, very good friend of mine.

THE COURT: Okay. All right. So I'm going to have to excuse Mr. Hanson.

So, Mr. Hanson, through no fault of your own, we are going to have to excuse you as a witness -- I mean as a juror because of your close relationship with an expert in this case.

I'm sure you would do your best to evaluate his testimony objectively, but you can understand how one side or the other would have concerns about that.

I'm terribly sorry that we didn't pick this up before and that you traveled here today. And I'm sure you would have been an outstanding juror.

But unfortunately I'm just going to have to excuse you because of your connection to Mr. Parrington.

JUROR HANSON: It is a small world.

THE COURT: It is a very small world.

(Laughter.)

THE COURT: Who would have thought? This is the first time I have had a trial where a juror actually did know one of the witnesses. And this witness is from Minnesota.

JUROR HANSON: I did not know he was in Minnesota now. I lost track of where Ron went.

THE COURT: Well, that's where he is. So --

JUROR HANSON: Can I comment on his value?

THE COURT: No. Nothing.

JUROR HANSON: Okay.

THE COURT: Nothing at all.

Again, thank you so much for your service. And I'm sorry you weren't able to serve this time.

JUROR HANSON: I'm sorry that happened.

MS. SHARP: Thank you, Mr. Hanson.

JUROR HANSON: What do I do?

(Laughter.)

THE COURT: Yeah. You can go back in the jury room; get your stuff. And if you need to check out of the -- back to the 18th floor, and just tell them that you have been excused through no fault of your own.

THE CLERK: Nineteenth floor.

I don't know if anyone is up there. Can I take your juror badge? They get very upset when you walk away with that.

JUROR HANSON: Okay.

THE COURT: Thank you, Mr. Hanson.

MS. SHARP: Thank you, Mr. Hanson.

MR. DUFFY: Thank you, Mr. Hanson.

(Juror Hanson exited the courtroom.)

THE COURT: All right. You can be seated. Ada is going to connect us. We are not connected yet to the AT&T line, and then we will bring the jury in.

I will read them the names of all the witnesses, and then I will do the preliminary instructions.

This is why we picked 10.

(Pause in proceedings.)

(Proceedings were heard in the presence of the jury:)

THE COURT: Good morning, members of the jury. Thank you for being so prompt this morning.

As you may have heard, we are going to start by -- we realized that the Survey Monkey that you had did not have the -- oh, the lawyers, you may be seated -- did not have the names of all the potential witnesses that might appear in the case.

As it turns out, Mr. Hanson was aware of one of the witnesses so we had to excuse him.

So I'm going to read some names to you now, and could you please raise your hand if you know any of these persons.

So I'm going to read you some names now, and these people all live in Ball Ground, Georgia: Brendan Wade, Buster Ingram, Frank Bies, Jeff Brooks, Jeffrey Dresow, Justin Junnier, Kyle Eubanks, Ramon Gonzalez, and Seth Adams.

All right. Then we have Dr. Angela Lawson from Chicago, Illinois; Dr. Eve Feinberg from Chicago, Illinois; Dr. Franklin Miller from Stanton, Wisconsin; Dr. Grace Centola from Florida; Eldon Leaphart from Texas; John Cauthen from Indian Rocks Beach, Florida; Ron Parrington from Plymouth, Minnesota; Gregory Mueller, Minnesota; William Pickell, Minnesota; Alden Romney, San Francisco; Anya Sokolova in Hawaii; Dr. Jinnuo Han in San Francisco; Hana Lamb from Colorado; Jennifer Andres.

These next witnesses all are from San Francisco: Jennifer Andres, Kathrin Buchanan, Valerie Hines, Dr. Carl Herbert, Dr. Carolyn Givens, Dr. Eldon Schriock, Dr. Isabelle Ryan, Dr. Liyun Li, Dr. Philip Chenette.

And then Arun Sharma from Chicago.

Do any of you believe you know any of these witnesses?

(No response.)

JURY INSTRUCTIONS

THE COURT: Okay. Great. Thank you.

All right. Now what I'm going to do is give you some preliminary jury instructions.

You are now the jury in this case. And I want to take a few minutes to tell you something about your duties as jurors and to give you some preliminary instructions.

At the end of the trial I will give you more detailed instructions that will control your deliberations.

When you deliberate, it will be your duty to weigh and to evaluate all the evidence received in the case and in that process to decide the facts.

To the facts as you find them, you will apply the law as I give it to you, whether you agree with the law or not.

You must not -- you must decide the case solely on the evidence and the law before you. You will recall that on Thursday you took an oath to do so.

At the end of the trial I will give you final instructions. It is the final instructions that will govern your duties.

Please do not take anything I may say or do during the trial as indicating what I think of the evidence or what the verdict should be. It is entirely up to you, the jury.

We all have feelings, assumptions, perceptions, fears, and stereotypes about others.

Some biases we are aware of and others we might not be fully aware of, which is why they are called implicit or unconscious biases.

No matter how unbiased we think we are, our brains are

hardwired to make unconscious decisions. We look at others and filter what they say through our own personal experience and background.

Because we all do this, we often see life and evaluate evidence in a way that tends to favor people who are like ourselves or who have had life experiences like our own.

We can also have biases about people like ourselves. One common example is the automatic association of male with career and female with family.

Bias can affect our thoughts, how we remember what we see and hear, who we believe or disbelieve, and how we make important decisions.

As jurors, you are being asked to make an important decision in the case.

You must, one, take the time you need to reflect carefully and thoughtfully about the evidence.

Two, think about why you are making the decision you are making and examine it for bias.

Reconsider your first impressions of the people and the evidence in this case.

If the people involved in this case were from different backgrounds; for example, richer or poorer, more or less educated, older or younger, or of a different gender, gender identity, race, religion, or sexual orientation, would you still view them and the evidence in the same way.

Three, listen to one another. You must carefully evaluate the evidence and resist -- and help each other resist any urge to reach a verdict influenced by bias for or against any party or witness.

Each of you have different backgrounds and will be viewing this case in light of your own insights, assumptions, and biases.

Listening to different perspectives may help you to better identify the possible effects these hidden biases may have on decision making.

And, four, resist jumping to conclusions based on personal likes or dislikes, generalizations, gut feelings, prejudices, sympathies, stereotypes, or unconscious biases.

The law demands that you make a fair decision based solely on the evidence, your individual valuations of that evidence, your reasoning and common sense, and these instructions.

Plaintiffs, Laura and Kevin Parsell, Chloe Poynton, Rosalynn Enfield, and Adrienne Sletten each engaged with Pacific Fertility Center to provide them with fertility services.

Plaintiffs' eggs and embryos were stored in a cryogenic tank referred to as Tank 4, which was designed and manufactured by Defendant Chart, Inc.

Plaintiffs allege that Tank 4 lost liquid nitrogen during an incident that occurred the weekend of March 4, 2018,

damaging or destroying their eggs and embryos.

The Plaintiffs assert that the tank malfunctioned because a defect in the way it was designed or manufactured by Chart and that Chart negligently failed to recall the tank's controller.

The Plaintiffs have the burden of proving these claims.

The Defendant Chart denies Plaintiffs' allegations and denies that Plaintiffs are entitled to an award of damages.

Chart contends that Pacific Fertility Center's misuse of the tank caused the incident and any alleged damage to Plaintiffs' frozen eggs and embryos.

The Defendant Chart has the burden of proof on its affirmative defenses, including that Pacific Fertility Center misused Tank 4.

The Plaintiffs deny Chart's affirmative defenses.

When a party has the burden of proving any claim or affirmative defense by a preponderance of the evidence, it means you must be persuaded by the evidence that the claim or affirmative defense is more probably true than not true.

You should base your decision on all of the evidence, regardless of which party presented it.

When a party has the burden of proving any claim or defense by clear and convincing evidence, it means that the party must present evidence that leaves you with a firm belief or conviction that it is highly probable that the factual

contentions of the claim or defense are true.

This is a higher standard of proof than proof by a preponderance of the evidence, but it does not require proof beyond a reasonable doubt.

You should decide the case as to each Plaintiff separately. Unless otherwise stated, these instructions apply to all parties.

The evidence you are to consider in deciding what the facts are consist of: The sworn testimony of any witness, the exhibits that are admitted into evidence, any facts to which the lawyers have agreed, which we will read to you, and any facts that I may instruct you to accept as proved.

In reaching your verdict, you may consider only the testimony and exhibits received into evidence.

Certain things are not evidence and you may not consider them in deciding what the facts are. I will list them for you.

Arguments and statements by lawyers are not evidence. The lawyers are not witnesses.

What they may say this morning in their opening statements, closing arguments, and at other times is intended to help you interpret the evidence; but it is not evidence.

If the facts as you remember them differ from the way the lawyers have stated them, your memory of them controls.

Questions and objections by lawyers are not evidence.

Attorneys have a duty to their clients to object when they

believe a question is improper under the rules of evidence.

You should not be influenced by the objection or by the Court's ruling on it.

Testimony that is excluded or stricken or that I instruct you to disregard is not evidence and must not be considered.

In addition, some evidence may be received only for a limited purpose.

When I instruct you to consider certain evidence only for a limited purpose, you must do so and you may not consider that evidence for any other purpose.

Anything you may see or hear when the Court was not in session is not evidence.

You are to decide the case solely on the evidence received at trial.

Some evidence may be admitted only for a limited purpose.

When I instruct you that an item of evidence has been admitted only for a limited purpose, you must consider it only for that limited purpose and not for any other purpose.

Evidence may be direct or circumstantial.

Direct evidence is direct proof of a fact, such as testimony by a witness about what the witness personally saw or heard or did.

Circumstantial evidence is proof of one or more facts from which you could find another fact. You should consider both kinds of evidence.

The law makes no distinction between the weight to be given to either direct or circumstantial evidence.

It is for you, the jury, to decide how much weight to give to any piece of evidence.

You will hear evidence about Pacific Fertility Center, Pacific MSO, and Prelude Fertility.

These entities are not defendants in this lawsuit.

Instead they are defendants in separate and ongoing arbitration proceedings brought by Plaintiffs.

Arbitration is a form of alternative dispute resolution.

There are rules of evidence that control what can be received into evidence.

When a lawyer asks a question or offers an exhibit into evidence and a lawyer on the other side thinks that it is not permitted by the rules of evidence, that lawyer may object.

If I overrule the objection, the question may be answered and the exhibit received.

If I sustain the objection, the question cannot be answered and the exhibit cannot be received.

Whenever I sustain an objection to a question, you must ignore the question and must not guess what the answer might have been.

In deciding the facts of this case, you may have to decide which testimony to believe and which testimony not to believe.

You may believe everything a witness says or part of it or

none of it.

In considering the testimony of any witness, you may take into account the opportunity and ability of the witness to see or hear or know the things testified to; the witness' memory; the witness' manner while testifying; the witness' interest in the outcome of the case, if any; the witness' bias or prejudice, if any; whether other evidence contradicted the witness' testimony; the reasonableness of the witness' testimony in light of all the evidence; and any other factors that bear on believability.

Sometimes a witness may say something that is not consistent with something else he or she said.

Sometimes different witnesses will give different versions of what happened.

People often forget things or make mistakes in what they remember. Also, two people may see the same event but remember it differently. You may consider these differences, but do not decide that testimony is untrue just because it differs from other testimony.

However, if you decide that a witness has deliberately testified untruthfully about something important, you may choose not to believe anything that witness said.

On the other hand, if you think the witness testified untruthfully about some things but told the truth about others, you may accept the part you think is true and ignore the rest.

The weight of the evidence as to a fact does not necessarily depend on the number of witnesses who testify.

What is important is how believable the witnesses were and how much weight you think their testimony deserves.

I will now say a few words about your conduct as jurors.

First, keep an open mind throughout the trial; and do not decide what the verdict should be until you and your fellow jurors have completed your deliberations at the end of the case.

Second, because you must decide this case based only on the evidence received in the case and on my instructions as to the law that applies, you must not be exposed to any other information about the case or to the issues it involves during the course of your jury duty.

Thus, until the end of the case or unless I tell you otherwise, do not communicate with anyone in any way and do not let anyone else communicate with you in any way about the merits of the case or anything to do with it.

This includes discussing the case in person, in writing by phone, tablet or computer, or any other electronic means via e-mail, text messaging, or internet chat room, blog, website, or application including not limited to Facebook, YouTube, Twitter, Instagram, LinkedIn, SnapChat, TikTok, or whatever the latest app is.

This applies to communicating with your fellow jurors

until I give you the case for your deliberations.

So this is important and this is hard, right. You are going to be sitting in court listening to this; but when you go back to your jury room, what I'm asking you is to not talk about the case with your fellow jurors.

And to not communicating with the -- your family members, your employer, the media or press, and the people involved in the trial although you may notify your family and your employer that you have been seated as a juror in this case and how long you expect the trial to last.

But if you are asked or approached in any way about your jury service or anything about this case, you must respond that you have been ordered not to discuss the matter and report the conduct -- contact to the Court.

You may -- although less now that we are doing these precautions -- but you may run into parties or lawyers in the hallways in the lobby and the like, and they may nod; but they are not going to say anything to you. And that's because they have been ordered not to communicate with you. They are not being rude.

Because you will receive all the evidence and legal instruction you properly may consider to return a verdict, do not read, watch, or listen to any news or media accounts or commentary about the case or anything to do with it.

Do not do any research such as consulting dictionaries,

searching the Internet or using other reference materials. And do not make any investigation or in any other way try to learn about the case or the lawyers or the parties on your own.

Do not visit or view any place discussed in this case, and do not use the internet or any other research to search for or view any place discussed during the trial.

And do not do any research about this case, the law or the people involved until you have been excused as jurors.

If you happen to read or hear anything touching on this case in the media, turn it -- turn away and report it to me as soon as possible.

These rules protect each parties' right to have this case decided only on evidence that has been presented here in court.

Witnesses here in court take an oath to tell the truth, and the accuracy of their testimony is tested through the trial process.

If you do any research or investigation outside the courtroom or gain any information through improper communications, then your verdict may be influenced by inaccurate, incomplete, or misleading information that has not been tested by the trial process.

Each of the parties is entitled to a fair trial by an impartial jury. And if you decide the case based on information not presented in court, you will have denied the parties a fair trial.

Remember, you have taken an oath to follow the rules, and it is very important that you follow these rules.

A juror who violates these restrictions jeopardizes the fairness of these proceedings and a mistrial could result that would require the entire process to start over.

If any juror is exposed to any outside information, please notify the Court immediately.

If there is any news media account or commentary about the case or anything to do with it, you must ignore it.

You must not read, watch, or listen to any news media account or commentary about the case or anything to do with it.

The case must be decided by you solely and exclusively on the evidence that will be received in the case and on my instructions on the law that applies.

Again, if any juror is exposed to outside information, please notify me immediately.

I urge you to pay close attention to trial testimony as it is given.

During deliberations you will not have a written transcript of the trial testimony.

If you wish, you may take notes to help you remember the evidence. If you do take notes, please keep them to yourself until you go to the jury room to decide the case.

Do not let note taking distract you. When you leave your notes should be left in the jury courtroom. No one will read

your notes.

Whether or not you take notes, you should rely on your own memory of the evidence. Notes are only to assist your memory. You should not be overly influenced by your notes or those of other jurors.

From time to time during the trial it may become necessary for me to talk with the attorneys out of the hearing of the jury, either by having a conference at the bench when the jury is present in the courtroom, but that's unlikely I think in present times. Most likely by calling a recess.

Please understand that while you are waiting, we are working.

The purpose of these conferences is not to keep relevant information from you, but to decide how certain evidence is to be treated under the rules of evidence and to avoid confusion and error.

Of course, we will do what we can to keep the number and length of these conferences to a minimum; and I may not always grant an attorney's request for a conference.

Do not consider my granting or denying a request for a conference as an indication of my opinion of the case or of what your verdict should be.

The trial is going to proceed in the following way. First, each side may make an opening statement. An opening statement, as I said earlier, is not evidence. It is simply an

outline to help you understand what that party expects the evidence will show.

A party is not required to make an opening statement.

The Plaintiffs will then present their evidence, and Counsel for the Defendant may cross-examine.

Then the Defendant may present evidence, and Counsel for the Plaintiffs may cross-examine.

After the evidence has been presented, I will instruct you on the law that applies to the case and the attorneys will make closing arguments.

And after that, you will go to the jury courtroom to deliberate on your verdict.

Thank you for your attention.

And, Ms. Sharp, would the Plaintiffs like to make an opening statement?

MS. SHARP: We would. Thank you, Your Honor.

OPENING STATEMENT

MS. SHARP: In March of 2018 a freezer tank holding thousands of human eggs and embryos catastrophically failed.

Chart, Incorporated manufactured and designed that tank.

The evidence in this trial will show that a weld cracked and the tank failed and imploded in exactly the way Chart, Incorporated had predicted years earlier.

But Chart did nothing. Said nothing. Chart still hasn't taken responsibility for the failure of its product. That's

why we are all here today.

Tank 4, as it was known, and -- it is right here in the courtroom. You can see it for yourself -- was a vacuum insulated storage tank, kind of like a big coffee Thermos, a bit like this (indicating), a familiar object, a coffee Thermos.

In a coffee Thermos the inner vessel holds the contents. The outer vessel is separate. It is the vacuum insulation layer between the two that is so critical.

It must stay totally airtight. That's the trick to keeping the contents of the inner vessel insulated from and unaffected by the temperature of the outside world.

Now, unlike a coffee Thermos, Tank 4 had welds in its inner vessel. And you will hear how the cracked weld in Tank 4 allowed liquid nitrogen to escape into that vacuum insulation layer causing the nitrogen to warm up, to flash from a liquid to gas, and expand to almost 700 times its original volume, causing the tank to implode like a crushed soda can.

It suffered a total vacuum loss. We will talk about that a lot.

But the weld in Tank 4 wasn't its only problem. Tank 4 came with a controller, which is a computerized panel meant to monitor conditions inside the tank and trigger an alarm if anything goes outside the norm.

The controller on Tank 4 had malfunctioned a little more

than two weeks before the tank failed in March of 2018.

So no alarm sounded to notify anyone of the disaster as it was unfolding.

The failure subjected the eggs and embryos inside the tank to an uncontrolled thaw, damaging or destroying them. The results, as you will see, were devastating.

This trial involves five people whose lives have been irreversibly changed by the tank failure: Adrienne Sletten, Rosalynn Enfield, Laura and Kevin Parsell, and Chloe Poynton.

These are all people who were proactively trying to preserve their fertility options, options that Chart took away, as the evidence will show.

Their eggs and embryos were in Tank 4 when it failed. You will hear their stories.

Now, Tank 4 -- slide, please -- Tank 4 held human eggs and embryos frozen and submerged in a bath of liquid nitrogen. It looked like.

This trial is about how Tank 4 went from looking like this to looking like that -- my clicker isn't going to work here. Now it's working -- like that.

Now, just to be clear, the picture you are looking at is the tank that is here in the courtroom. It is just a picture from above since we are all spread out in the courtroom.

Now, this trial will focus on three main questions. First, how Tank 4 failed. That first and last line of defense

for the eggs and embryos inside and the choices Chart, Incorporated made about it, the things that only Chart knew that led to that failure.

Second question: Chart's responsibility for what happened. The tank failed at an IVF clinic.

Chart will present evidence trying to blame the clinic, and only the clinic, for the tank failure because Chart does not accept responsibility.

MR. DUFFY: Objection. Argumentative.

THE COURT: Overruled.

MS. SHARP: As Judge Corley just instructed you, the IVF is being sued in different legal proceedings called arbitrations and will be answerable then.

Even so, you will hear from the clinic staff in this trial. The clinic director, Dr. Conaghan, will come here; and he will testify in person, as will several of the embryologists from the clinic.

They will tell you about that day. They will tell you about how they felt when they realized the tank had failed. They will tell you about the aftermath at the clinic.

Now, neither the IVF clinic nor the embryologists who work there are defendants in this trial, though.

This trial is against Chart, Incorporated. And this trial is about whether Chart will take responsibility for the failure of its own product.

What you will not see in this trial is a single person from Chart, Incorporated who could be bothered to come and testify live in this courtroom.

MR. DUFFY: Objection, Your Honor. Motion for a mistrial.

THE COURT: Sustained. We will address it later.

Go ahead.

MS. SHARP: Now, even though Chart's people know the tanks better than anyone else, you will hear from their experts.

Now, the third question in this trial will be how the Tank 4 failure impacted the lives of these five individuals.

These individuals are people from different walks of life who all are brought together by the misfortune of having had their eggs or embryos, that precious cargo, those hopes and dreams in that tank on that fateful day in March of 2018.

Now, a quick note here on the difference between eggs and embryos.

An embryo is an egg that has been fertilized so it is a little further along developmentally. Whether.

They had eggs or embryos in that tank, none of these people can turn back the biological clock to where they were before that day.

You will hear in this trial that a 34-year-old egg has better odds than a 38-year-old egg, which has better odds than

a 42-year-old egg and so on.

As a result, a 34-year-old egg can't just be replaced by another one. It is not that simple. That's not how it works.

Time was of the essence for each of these five people back when they decided to go ahead with IVF. They will tell you about that.

Time is still of the essence for them now. You will hear it for yourselves.

Now, because we are the Plaintiffs, it is up to us to prove our case. As Judge Corley just explained, we have the burden of proof.

What that means is that it is our job to prove to you more likely than not that Chart is responsible for the tank failure.

We will talk more about the burdens later, and we will talk about how they are different from the reasonable doubt standard we see on crime shows on TV.

For now, just know that we have our burdens. Chart has its burdens. And you should hold us both to our burdens.

Now, to help us get to the right answers together, let's start with the facts and a timeline of events and what we believe the evidence will show.

But before that, I would like to introduce our trial team, the lawyers for the Plaintiffs who you will see day in and day out in the coming days. To my left is Amy Zeman. Next to her is Jeff Munroe, Adam Polk, John Bicknell, Nina Gliozzo. I'm

Dena Sharp.

And we, of course, thank you jurors; and we thank the Court and the staff for being here for making this happen.

Without all of you here, these Plaintiffs would still be waiting for their day in court more than three years after the tank failed. So let's get to work.

The tank, something happened to Tank 4. On the outside, as you can see, it might look fine. On the inside -- again, as you can see -- it does not.

In the Plaintiffs' case you will learn about Chart's failure analysis, the results of forensic testing of the tank, expert analysis of what caused the failure; and you will have the evidence to decide for yourselves whose version of events holds up.

Now, Chart holds itself out as the world's leading manufacturer of vacuum-insulated products and cryogenic systems.

According to Chart, it has set the standard for storage of biological materials for more than 50 years, as you can see the -- from the document in front of you.

It also says that its tanks have a 10-year life expectancy.

Chart's tank have one job: To keep biological material ultra cold and ultra safe.

But something obviously went wrong with that tank. What

was it? What happened? That will be a central issue in this case.

You will hear from Dr. Kasbekar, a mechanical engineer, first. He will be our first witness today. He will teach all of us about the decisions that go into making a tank like this.

He conducted an investigation. He did testing. He will explain his findings.

He will explain that one important difference between an ordinary Thermos like this one (indicating) and Tank 4 is that there were welds on the bottom of the inner vessel of Tank 4, as I mentioned.

The slide in front of you now shows a rendering of a cross-section of the tank. The welds at the bottom of the inner vessel connected the tank's liquid nitrogen fill tube, which is one of these tubes that you can see that runs from the top of the tank down through the vacuum insulation layer and connects to the tank's inner vessel with a small piece called an elbow fitting.

That elbow fitting was then welded to the inner vessel, and that is the weld that cracked.

There is the crack on the picture in front of you. You can see it for yourself. It might look small -- and it is -- but it doesn't take a lot to have enormous consequences for the tank and its contents.

The red dye in the photograph in front of you shows the

crack. It is a little faint because it seeps in, but there it is.

And here is a video of a test that was done on the crack. Now, this is the actual tank. This one in the courtroom too -- the actual crack and gas bubbling right on through that crack.

The camera work is a little shaky, but the crack, it's undeniable.

Dr. Kaskebar will also explain how he participated in testing with Chart and its experts that revealed to all involved, that crack in the tank.

Even Chart now acknowledges, as it must, that the weld cracked. So the question will be why.

The evidence will show that the weld wasn't manufactured to its designed specification. Chart's plan called for this weld to be what is known as a full or complete penetration weld, a robust weld that goes all the way through the full thickness of the metal. It is supposed to bind together.

Why? Why specify that this should be a thick weld? Because it is an important weld responsible for safeguarding human tissue. That's why.

And because it is on the fill tube for liquid nitrogen, it is a weld that is subject to the stress of heating and cooling, expansion and contraction.

I mean, those are good reasons for it to be a strong weld.

But despite all that, Chart used thinner and, therefore,

weaker partial penetration welds instead.

As the name implies -- and as Dr. Kaskebar will explain -- partial welds don't go all the way through the metals being enjoined. The welds on Tank 4 were paper thin. No more than the breadth of a human hair.

You will see evidence of the difference between strong welds and Chart's welds on Tank 4.

What you are looking at here on the slide now are three CT scans of welds.

The green circles show good strong welds; whereas the red circles show incomplete welds. Let's walk through them.

On the right-hand side of the screen, you can see a proper full penetration weld as was called for in Chart's design specifications.

Note that there are no sharp angles. Note how full the welds are.

In the middle panel you see a weld on a different Chart tank, which shows superior weld penetration, at least at the top.

And on the left-hand side, you can see Tank 4's partial penetration weld.

Now, compounding matters, as you will learn, is the fact that Chart used a fitting that didn't fit.

You have heard about a square peg in a round hole. Same idea here. A flat fitting on a round tank doesn't work that

well.

You can see in the CT scan on the left side of your screen the V-shaped notches in Tank 4's welds. Those notches created sharp points that concentrated and intensified the stress precisely where that weld crack started, as you will learn.

That sharp angle created a divot. And you will hear from Dr. Kaskebar about how that divot in the metal is kind of like an indentation in a Hershey's bar that makes it easy to break apart. Over time the fatigue crack propagated through the entire thickness of the weld, as the evidence will show.

You will also hear that Chart only welded the fitting on one side instead of both.

Now, Chart could have welded the fitting on both sides of the inner vessel. The resulting weld would have been stronger. It would have eliminated those sharp points and the stress concentrator at the root of that weld. But Chart didn't do that.

Dr. Kaskebar will walk you through the sequence of the tank failure that he concludes resulted from that cracked weld.

He will explain how that crack allowed liquid nitrogen to escape into Tank 4's inner vessel into that critical vacuum insulated layer we talked about.

He will explain how the nitrogen was warmed by the surrounding air; how it flashed from a liquid to gas. And, again, how it expanded almost 700 times its original volume.

The presence of so much liquid nitrogen trapped between the tank's inner and outer vessels exerted a significant amount of pressure. That's why the inner vessel imploded. That's why it ended up looking like that.

And even more importantly, once that vacuum layer filled with high-pressured nitrogen gas was there, there were plenty of molecules to facilitate heat transfer, Tank 4 could no longer protect its contents from the surrounding air. It could no longer keep its contents cold. The result: Total vacuum loss, loss of function.

Now, as it turns out, Chart knew what the consequences of a weak weld like this would be. And in a failure analysis that Chart had conducted years before the tank failed, Chart predicted what would happen to Tank 4 to a T.

The document now on the screen in front of you is an internal document where Chart engineers analyzed and predicted the ways in which their tanks might fail.

Chart's internal analysis says, clear as day: If this weld fails the tank can implode.

Let's take a moment with this document. As you can see the title of the document is Chart's Design Failure Mode, Effects and Criticality Analysis. Dr. Kaskebar may slip into alphabet soup sometimes and call it a DFMECA. That's what he is talking about is this document.

The item that it is analyzing is the dewar annular lines.

The item function is the fill line from the outer to the inner vessel we have been talking about.

Let's focus on the highlighted language. Potential design failure mode, crack, or leak. Check.

Potential cause of design failure mode, weld line failure. Check.

Immediate effect of failure. These are the words on the page. I will read them exactly: Liquid nitrogen draws into vacuum space expanding rapidly and causing an inner vessel implosion, total vacuum loss, loss of function of the freezer. Check, check, check.

You will hear in more detail shortly about how Dr. Kaskebar's explanation maps exactly onto what Chart had predicted could happen back in 2012.

Chart didn't disclose any of that. Chart alone knew. Before it even supplied the tank to Pacific Fertility, Chart knew. Chart also knew, and still knows, what the tanks are safeguarding.

The evidence will show that Chart cut corners.

Now, despite all that, we expect that you will hear from Chart that it must have been user error at the clinic.

Chart's defense, as best as we can make it out so far, will be that the folks at the clinic somehow let that tank run dry in the days and weeks before March 4th, somehow causing that tank to implode, which in turn led to the cracked weld.

But the evidence will show that that defense is the opposite of what Chart itself predicted by 2012, as we just reviewed.

Even Chart's own document created long before this lawsuit was ever filed says that a crack causes an implosion, not the reverse.

Again, the highlighted language at the bottom: Liquid draws into vacuum space expanding rapidly and causing an inner vessel implosion. That's the key language. Those are the words on the page. That's a crack causing an implosion, not the reverse.

Now, Chart's defense that by letting the tank drain of liquid nitrogen the clinic staff somehow broke it is also contrary to Chart's own recommendations that customers may periodically drain, thaw, and clean their tanks for preventative maintenance.

They don't warn about implosions, though. The simple fact is these tanks are designed to be thawed out and emptied out.

If just drying out the tank would make it implode, we would see these implosions all the time. And yet you will hear from one expert after the next, one embryologist after the next, with collective decades of experience, who will tell you how rare tank implosions like this are.

No one at the clinic with their decades of experience had ever seen anything like it.

Now on top of all that, the evidence will also show activity in Tank 4 leading up to March 4th. And that's significant in at least a couple of ways.

One is by being in and out of the tanks the staff kept a close eye on the liquid nitrogen levels. They couldn't help but do so.

The embryologist could see the liquid nitrogen levels in the tank with their eyes, plain as day. The embryologist could see -- they will explain how they could see the eggs and embryos are kept submerged in that bath of liquid nitrogen.

They are held in canisters or boxes that they will tell you are about 11 inches tall. They will tell you how they can tell just by eyeballing it if there is not enough liquid nitrogen to keep the tissue safely submerged.

Now, the activity in the tanks leading up to March 4 is significant in a second way. And that's because dozens of procedures were successfully performed involving eggs or embryos that came from that tank in those days when the tank was, according to Chart, low or out of liquid nitrogen.

You will hear how there have been successful births from Tank 4 tissue that was retrieved in the days leading up to March 4th.

And there is no dispute -- we all agree -- that the tissue stays safe only if there is enough liquid nitrogen to keep it submerged.

Would the clinic staff just have missed that? Would they have just let the liquid nitrogen run out of the tank?

Now, Chart would apparently have you believe that every one of the clinic witnesses -- the embryologists, the Ph.D.s, all of them -- must not be telling the truth, must all be part of some big coverup.

What the forensic evidence will show, though, is that Tank 4 had plenty of liquid nitrogen every day until the failure.

The embryologists will tell you how they made sure the tank was full, just like they had every day for years; the same routines to ensure they kept the tanks filled with more than 12 inches of liquid nitrogen to keep the eggs and embryos cold and safe, because as they will tell you, that's their job.

You will learn that it is normal for an inch or two of liquid nitrogen to evaporate out of the tanks each day.

So at the end of the day staff at the clinic would check the level and top off each tank with liquid nitrogen, if needed.

You will also hear that the more a tank's lid is off for procedures, to retrieve and place tissue into it, the more liquid nitrogen will evaporate that day, leading to variability in the amount of liquid nitrogen any given tank may need on any given day.

So it may take longer to fill the tank from one day to the

next. A lot of factors go into that. The embryologists will explain that too.

And you will hear how the daily fluctuations are normal. And they are exactly why the clinic carefully monitored the tanks and had quality control data monitoring for trends and outliers.

At the end of the case you will decide what caused the tank to end up looking like that (indicating).

The obvious thing, the thing Chart predicted years before this tank failed, or something else?

Now, we have talked a lot about the tank failure itself, but why does it matter? Well, it matters because, as you will learn over the coming days, what this case is really about is what was inside that tank and the way the tank failure has changed the Plaintiffs' lives forever.

The tank had one job: To keep its contents ultra cold and ultra safe and fully submerged in liquid nitrogen.

You will hear Dr. Somkuti, a reproductive endocrinologist, and he will talk about the difficult process of retrieving and storing eggs and embryos in IVF.

He will talk about how reproduction is one of the most basic of human impulses and how the prospect of losing that option can be so stressful.

He will talk about how deciding to make the emotional, physical, and financial investment to do IVF is not like buying

a handbag or a car; not even like acquiring a family heirloom or precious jewelry. It is so different than all that.

You will hear Dr. Wininger, an embryologist with 30 years of experience, explain just how critical it is to keep cryopreserved eggs and embryos at a consistently very low temperature, to keep that tissue safe until it is intentionally and carefully thawed under tightly controlled circumstances.

You will hear from Dr. Jewell, a statistician, as well as Dr. Wininger and Dr. Somkuti about how the uncontrolled thaw on March 4, 2018, destroyed or damaged the eggs or embryos in Tank 4.

They will explain what success rates usually look like in general, what they look like historically at PFC; and they will explain how poorly Tank 4's post-failure outcomes compare.

The bar graphs on the screen in front of you show some of that data. The blue bars show outcomes from PFC in 2017, and the red bars show the post-Tank 4 incident outcomes.

You don't need a statistics degree to see just how poorly Tank 4's outcomes compare. The bar graphs say it all.

You have egg thaw success rates, embryo thaw success rates. And on the next slide -- on the next slide, please -- we have overall success rates.

Now, all those figures are against the backdrop of knowing that it is not even recommended for Tank 4 patients to try to use the tissue because there may be added risks.

The tissue so far has more than doubled the chance of low birth weights, which are a known indicator of health complications.

And, of course, it is just too soon to know about any unknown or latent effects.

You will hear from the Plaintiffs themselves in this trial, all of whom had their own fertility journey.

You will hear what they all have in common is that they had eggs and embryos on Tank 4 in that fateful day in March of 2018. You will meet them all soon. They are here today in the courtroom and via Zoom.

They will have a chance to tell each of you how their lives were changed by the tank failure.

You will hear from Dr. Elizabeth Grill. She is a reproductive psychologist. She will tell you about how traumatic the failure and the loss has been for each of the Plaintiffs, how it has caused each of them grief, sadness, suffering, panic, anxiety.

And now there are a lot of dates to remember in this case so we put together a timeline that we hope you find useful. It will help us keep track of what happened and when and who knew what when.

So let's start at the beginning. January 24, 2012, Chart, Incorporated supplied Tank 4 to Pacific Fertility. And a couple months later PFC began storing eggs and embryos in

Tank 4.

In February of 2013, Rosalynn Enfield froze 18 eggs. This is a picture of Ms. Enfield. She is in the courtroom today too. Ms. Enfield was 34 when she decided to freeze her eggs in February of 2013.

She will tell you about how she knew that age 35 is an important milestone in a woman's life as it relates to fertility, with egg quality and quantity degrading precipitously after that age.

Ms. Enfield had not yet met the right guy in 2013, so she planned ahead and preserved her options.

At age 34, she froze 18 eggs. They were all stored in Tank 4.

In 2013 Laura and Kevin Parsell created seven embryos. They transferred one successfully and they froze the remaining six. Here are Laura and Kevin Parsell. The Parsells are with us via Zoom today as they are currently in Ohio where they are tending to their farm and watching their two kids.

They will be here in person when they testify later on in the trial, though. And Laura and Kevin will each tell you how each of them was diagnosed with a serious fertility condition, how they were faced with seemingly insurmountable odds, and how after multiple procedures so many doctors, tireless efforts.

You will hear them testify about the joy and the relief that they felt when they learned that they had successfully

created multiple embryos.

They made concrete plans to use every one of those embryos. They will tell you they wanted a large family.

The first transfer gave them a first child, a son, leaving six embryos in Tank 4.

In September of 2015, Laura and Kevin Parsell transferred a second embryo from Tank 4 but they ultimately miscarried.

In April of 2016 -- again, long before the incident -- the Parsells tried again. They transferred a third embryo from Tank 4. This time happily a success.

A second child, a daughter, was born, a daughter who came from an embryo frozen in Tank 4 alongside four others who shared genetic material.

In May of 2016, Adrienne Sletten froze two eggs. This is Ms. Sletten on your screen. She, too, is in the courtroom today.

Ms. Sletten was 38 when she decided to freeze her eggs. She will tell you that she always knew she wanted to be a mom. She is close with her own parents and family; but by 2016 when she was 38, she had not yet met the right partner to start a family with.

She will tell you how she decided to be proactive about freezing eggs before it was too late. Although Ms. Sletten was only able to retrieve two eggs after a difficult IVF process, she will be the first to tell you that two is a lot more than

zero.

Those two eggs were stored in Tank 4.

In August of 2016, Chloe Poynton froze nine eggs. This is Ms. Poynton. She is in the courtroom today too.

She was 34 when she decided to freeze her eggs. Ms. Poynton will tell you that she was in 2016 in an unstable relationship and felt the march of time.

So she wanted to give herself a chance to find the right partner and to build the family she had always wanted, much like the family she grew up in.

She had nine eggs that were stored in Tank 4. And then in March of 2018, the tank failed.

Everything changed for these individuals on that day.

You will hear all about what happened on March 4th at the clinic. You will hear from Dr. Popwell, who has been an embryologist for more than 20 years.

She will testify about topping off the tank in the days before March 4th, how she saw no issues with the tank itself, how she went about her usual routine.

You will hear from Dr. Conaghan, the clinic director, about how on Sunday, March 4th, he arrived at the lab early as usual and noticed nothing unusual at all.

But when he started shutdown procedures, Dr. Conaghan will tell you that he suddenly discovered that Tank 4's lid was stuck in place and condensation had pooled onto the tank.

He will testify about how he knew at that moment he had a serious problem on his hands.

He will tell you about how he and Dr. Popwell, an embryologist with decades of experience, worked together quickly to try to pry the lid off that tank. That tank (indicating). How they looked inside the tank, and their measurements indicated that there was little or no liquid nitrogen left in the tank.

The embryologists will tell you how the tank already began to buckle and dent when they found it, and how they carefully, delicately transferred the eggs and embryos to a back-up tank as quickly as they could once they discovered the state of Tank 4.

You will hear how they hadn't seen any problems or warning signs with Tank 4 in the days and weeks leading up to the tank's failure; though they are trained to look for those things. They know what to look for.

How they and other experts, like Dr. Wininger, would expect a tank to fail gradually, to exhibit warning signs like frost on the exterior, how they wouldn't expect a sudden and catastrophic failure like this from a tank like that.

And how in the hours and days after they discovered the failure, the tank continued to crumble. By the next day it had buckled, and it ultimately imploded.

They will tell you how they had never seen anything like

it before.

Now, let's look at a different timeline. Let's look at a timeline showing what Chart knew but didn't tell.

Now, as to the tank, you've already seen what Chart knew about what the damage a crack could do.

By January of 2012, Chart, Incorporated predicted that a weld crack could result in an implosion and a total tank malfunction. This is the document we looked at before.

As a reminder, this document shows that before Chart's supplied Tank 4 to PFC, and six years before the tank failed in March of 2018, Chart predicted that a weld could crack and the tank could fail and implode.

Just like it did.

Chart called it. But it didn't tell its customer PFC. Chart didn't share this failure analysis. No one at the clinic had reason to know. Only Chart knew.

Now, we have talked about Tank 4 and its cracked weld a lot. There is another important part of the story, though. The controller. So let's pause. What is a controller?

Chart's MVE 808 tank comes as a unit with an integrated controller. It is called a TEC 3000. It is a monitor. It is used to help track the tank's conditions, to sound an alarm, and automatically start to refill the tank if the liquid nitrogen drops below a certain level.

The controller is part of the tank unit that Chart shipped

PFC in 2012.

Though the controller comes with the tank, the tank can work perfectly well without the controller because, again, the tank works like a Thermos.

It is the liquid nitrogen inside that keeps it cold. It is not otherwise plugged into the wall or dependent on power; but the controller, which is a mini computer, does need to be plugged in.

Chart's controller on Tank 4 malfunctioned on February 15, 2018, just a couple weeks before the tank failed.

Dr. Conaghan, the clinic director, will tell you about how he tried to troubleshoot it but was unable to fix it.

Now, we have already talked about how Chart will try to deflect responsibility and blame the clinic.

One way is by trying to blame the tank failure itself on the clinic.

Another is by claiming the clinic for not replacing or fixing Chart's broken controller fast enough.

So let's preview know what Chart knew but didn't tell about that controller that came along with the tank.

By May of 2015, nearly three years before the tank failed, Chart knew that its controller had a malfunction. They even had a name for it. They called it the SN=0.

Serial number would display as 0, hence the name SN=0. The controller would no longer be able to accurately read

temperature of liquid nitrogen levels.

It would falsely read one or both as basically 0. And alarms, constant piercing false alarms.

If left plugged in, the controller would keep on filling with liquid nitrogen, too regardless of how full the tank may already be.

By October of 2015, complaints of the same malfunctions were happening worldwide, globally.

By February of 2016, at least some Chart employees recognized the problem.

In the e-mail on your screen now a Chart employee says: We should plan to take action immediately as we have just experienced another 10 or so controllers that failed.

This is February of 2016, more than two years before Tank 4 failed. Did Chart take action immediately? It did not.

In May of 2017, more than a year later, a Chart employee sent an e-mail noting as follows: SN=0, the name they gave that malfunction, is usually accompanied by settings going haywire. Level reading 0 and both temps reading minus 273 degrees Celsius.

In other words, the controller was misreading both the liquid nitrogen levels and the temperature.

Even if controllers are functional afterwards, he wrote: Customers are not comfortable keeping the controllers installed as they see it as a failure regardless.

What this tells us is that Chart was aware by February 2016 that, one, the controllers were going haywire; and, two, the users would disable them.

The controller below was replaced in late March, he wrote, and the same issue has happened again.

The malfunction happened repeatedly.

Now, by the end of 2017 Chart had developed a retrofit to fix the SN=0 haywire problem.

But just like it chose not to disclose the defect, Chart chose not to disclose the fix, at least to Pacific Fertility.

In November of 2017, a Chart employee wrote: Chart -- that Chart chose to, quote, try not to call attention to the issue with the customer, obviously.

And sure enough, three months later on February 15, 2018, the controller on Tank 4 at Pacific Fertility malfunctioned.

You will hear from Dr. Conaghan that when it malfunctioned on February 15, the controller exhibited these same symptoms, the surrounding -- the sounding false alarms for low liquid nitrogen levels.

Though Dr. Conaghan, himself, was there that day, he looked into the tank; and he will tell you that there was plenty of liquid nitrogen in that tank that day when the alarm was going off showing that it had nothing. It was continuously filling with liquid nitrogen.

The controller was showing a temperature colder than the

coldest temperature on earth. The controller's malfunction made it both infective and unsafe.

Now, since he couldn't fix it, all Dr. Conaghan could do right then was unplug it. And predictably, like Chart's other customers with malfunctioning controllers, the clinic didn't trust the controller that was on the frits and moved on to manual monitoring.

All that means is they checked the tank using a dipstick, a big ruler, in their end-of-day procedures instead of using the controller to measure the levels of liquid nitrogen in the tank.

Now, Chart may suggest that Dr. Conaghan and the staff in the clinic ignored hundreds of alarms on the controller; but keep in mind that those alarms were coming from a malfunctioning controller, kind of like the smoke alarm when there is no smoke and no fire.

The one thing the clinic did continue to use the controller for was its autofill function. They will tell you how they could press a button -- they would plug it in; press a button; and it would activate to fill the tank with liquid nitrogen when they needed it because those lines were already plumbed.

Plugging in the malfunctioning controller would cause the piercing alarm to sound regardless of the actual conditions in the tank.

So the controller would alarm, say there was no liquid nitrogen, even though the embryologist could see for themselves right there that there was plenty.

All the same, Chart will try to criticize the clinic staff for making do with Chart's defective controller as best they could after it failed.

Now, the tank was still working fine.

The clinic had asked the supplier for a fix for the controller but hadn't received a replacement yet when Tank 4 failed on March 4th.

The upshot of all this, yes, both the cracked weld and the controller contributed to the loss.

The evidence will show that Chart bears most, if not all, responsibility for the controller not working at the time. And the tank? That's all Chart.

Now, Chart will critique the clinic staff in this trial for the way they did their jobs between when the controller failed on February 15th and when the tank failed on March 4th.

Chart may suggest that to make up for Chart's faulty controller, Dr. Conaghan should have, in those 17 days, done things differently; like gotten a new controller, or cannibalized it with another, or put some other alarm on the tank to make up for Chart's faulty controller.

But as you listen to the evidence, think about who knew what and when.

Now, Chart, for its part, had known about the dangerous weld crack in the tank for more than six years before the tank failed.

Chart had known about the controller issues, that they would go, quote, haywire; that customers didn't feel comfortable using them after that for almost three years.

And even though one Chart employee had the right instinct, as you saw, to take action immediately, in the end, Chart chose to try not to call attention to it with the customers, obviously.

Meanwhile, the lab staff will explain how, in those 17 days, between when the controller failed and the tank failed, they had seen no problems with the tank itself; though, again, they are trained to -- and they know how to recognize the signs of failure. They will tell you about that.

They will tell you how they would expect a vacuum failure to happen gradually, not fast. And how they were at any rate monitoring that tank every single day since someone is in the clinic 365 days a year.

They were in and out of the tank, often several times a day, as you will hear the embryologist explain.

And unplugging the controller didn't affect the performance of the tank at all.

And, of course, as you saw earlier, Chart holds out its tank as having a 10-year life-span, whether a controller is

attached or not.

Remember that by March 2018 Tank 4 had only been in service at PFC for six years, well within that life-span.

You will hear from a Chart employee who testifies in his video deposition that Chart tanks can maintain liquid nitrogen for weeks on end.

Chart also touted its hold times of at least 7 days. What this means is that a tank could be left unattended for a long time, so long as the liquid nitrogen was safely sealed up in there.

Just like Chart knew its tanks had problems, it knew about the problems with its controllers too. And just like Chart didn't disclose the problems with its tank, it didn't disclose the problems with its controllers either.

Did Chart cut corners even though it knew products were used to safeguard human eggs and embryos? You will decide.

One thing is for sure: You will hear how those unfortunate enough to have had their tissue in Chart's tank that day in March 2018 are still paying the price.

So now you have the basics of the timeline and what happened to that tank.

So what is next in this trial? After you have heard me out today, Chart will give its opening statement. Then we will put on the evidence, as Judge Corley said.

First we, the Plaintiffs, will put on our case. And then

Chart will put on its defense. We will both deliver closing arguments.

When we come back for closing argument, we will ask you to think about the most common sense explanation for how Tank 4 ended up like this. After closing arguments, the Judge will instruct you.

While the five Plaintiffs in this case cannot replace what Chart has taken from them and cannot turn back the biological clock, at the end of the case after you have heard all the evidence, we will ask you to try to decide how best to compensate them for what they have lost, for what they have gone through.

You will be presented -- you will be presented with a verdict form. It will have blank spaces on it for you to write in how much money each Plaintiff should receive to compensate for the losses that Chart has caused.

It is up to you -- it is up to us to show you what these individuals have lost.

Now, there are two kinds of damages in this case as we discussed in jury selection; and I will acknowledge neither is easy. Neither is straightforward.

First are economic damages to compensate for the loss of the eggs and embryos themselves such as they are. Irreplaceable, the most personal of property, as strange as it even is to call it property.

They don't have a market value, of course; but we will try to establish their value starting with the time, expense, and difficulty in obtaining the eggs and embryos, their irreplaceable nature and character given they are human genetic material, given the use for which they are intended.

We will note their time sensitivity, given that a 38-year-old woman can never get back her 34-year-old eggs.

The second category of damages are non-economic damages. Those try to compensate for the experience of losing the eggs and embryos and all that entails. There is no formula for how to compensate for emotional distress. You will, again, be asked to use your common sense.

We will ask you to require Chart to compensate the Plaintiffs for these experiences they have had as a result of the tank failure.

We will ask you to consider how the Plaintiffs' lives were changed by the Tank 4 failure. You will be asked to use your judgment to decide a reasonable amount based on the evidence and common sense. It will be up to you.

Now, you have heard a bit about each of these individuals and the unique stories of how they each came to have eggs or embryos in Tank 4.

Slide, please.

When they testify, you will also hear where they are today, how the losses still impact their lives every day.

Adrienne Sletten, Rosalynn Enfield, Laura and Kevin Parsell, Chloe Poynton.

As you see and listen to the evidence in this trial, ask yourself if any of these people would be where they are today had Chart made different choices, had that tank done the job it was supposed to do, had that controller done the job it was supposed to do.

After all is said and done in this trial, you will be asked to deliberate. All we ask is that you focus on the evidence, focus on what actually matters, focus on the three questions we talked about earlier.

One, what happened to that tank?

Two, who should answer for it?

And three, how did it affect these people's lives?

There are a lot of different issues wrapped up in this case. You will hear evidence about engineering and metallurgy, mini computers, QC data, IVF labs and all the equipment that comes in them, tiny and small, large, unwieldily.

And, of course, you will hear the evidence of the most complex textured issues of all: The human psyche and emotion, the sadness, grief, joy, hope, sorrow, love, and ultimately loss that these people have experienced. How they have each felt that most basic human impulse to reproduce, to have children, to bring life into the world.

You will hear how each of their stories has unfolded.

But in the end the case is pretty simple. Chart, Incorporated made a tank that it knew would be used to safeguard human eggs and embryos.

The tank had one job: Keep those eggs and embryos ultra cold and ultra safe. But the weld cracked and the tank failed and imploded in ways Chart, but not anyone else, predicted.

Chart's tank is what these Plaintiffs have in common. It will be up to you to decide whether to hold Chart responsible and how to try, or at least begin to try, to compensate these people for the losses Chart has caused them and all those losses entailed.

We look forward to the privilege of presenting you with the evidence you need to render a verdict.

Thank you.

THE COURT: Thank you, Ms. Sharp.

Members of the jury, we will now take our first morning break. We will take a 10-minute break.

As always, please do not discuss the case. Keep an open mind. And we will resume in ten minutes or so. Thank you.

(Proceedings were heard outside the presence of the jury:)

THE COURT: If I can ask the guests that we have in our very last row, if you can please sit 6 feet apart.

The reason our lawyers are allowed to be together is because they all have vaccinated pods. And I don't know as to the other people. But it's important that we keep 6 feet.

Thank you.

MS. SHARP: The two of them are in our pod, Your Honor, but we will --

THE COURT: Are they? I think it is just better for the jury as well.

MS. SHARP: Absolutely. Thank you, Judge.

THE COURT: Mr. Duffy, did you want to raise an issue?

I did sustain the objection. I think you crossed over into argument there.

I think it is a fact that all the Chart witnesses are appearing by deposition; but that was an argument that you made there, which is why I sustained the objection.

MR. DUFFY: Your Honor, I also had a motion for a mistrial. I think that very comment is prejudicial to my client, and I don't think we can get a fair trial based upon the argument that she made, which is, frankly, inappropriate.

THE COURT: I don't know that's the case. It is a fact. It would be one thing if it was said about third parties; right. But what she was doing was commenting that all of Chart's witnesses are appearing by deposition.

So the mistrial is overruled, but she is not going to argue it anymore.

MS. SHARP: I will not anymore. I will argue it in closing argument.

THE COURT: Well, we will discuss it in advance.

MS. SHARP: Very well.

THE COURT: It might be more appropriate maybe in the next phase as to that.

MS. SHARP: Fair enough. Thank you, Your Honor.

MR. DUFFY: I think I want to set up the camera.

THE COURT: Oh, okay. We will take a 10-minute or maybe a 9-minute break now.

(Recess taken at 10:09 a.m.)

(Proceedings resumed at 10:25 a.m.)

THE COURT: Thank you, members of the jury.

Now Chart will give its opening statement.

OPENING STATEMENT

MR. DUFFY: Good morning. My name is John Duffy, and I represent Chart.

In the opening statements of my opposing counsel you heard the phrase "there were no alarms for two weeks." "There were no alarms for two weeks." That's wrong.

You also heard from opposing counsel that there were no warning signs. That's also wrong. You heard from my opposing counsel that PFC had never seen anything like this before. That is also wrong.

I would like to introduce you to Laura Ashby from Chart, who is here with us today. I am also joined by my colleagues in this trial, Kevin Ringel, Kristine Reveille, who you met in jury selection, and Andrew Lothson.

The employees that helped design and build this freezer are now ex-employees working on freezers for the vaccines.

Now, what did happen? What did happen? You didn't get a lot of facts in the opening statement about what did happen.

On February 15th, 2018, the controller on Tank 4 started to have a functionality problem. It was reading low liquid nitrogen when there was sufficient liquid nitrogen in there. So what did it do? The very thing you heard supposedly never happened. It alarmed. It alarmed.

Now, Tank 4 not only has an audible alarm at the tank -- loud; sufficiently to jar you to do something -- but after a period of time, if you don't do something, our product sends a signal to a device called a Sensaphone.

What is a Sensaphone? It's a dialer. It calls the lab personnel, and it also sends them a text message.

On February 15, Dr. Joseph Conaghan, a Ph.D. embryologist, walked over and unplugged Tank 4 with human tissue inside of it. That's what caused this loss.

Now, how does this freezer work? It's important. The freezer that we have here is an MVE 808, made by my client. And what does it do? It keeps human tissue extremely cold so that it does not begin to degrade.

In order to do that, liquid nitrogen is absolutely necessary. And liquid nitrogen is called for by the computer controller that I put -- I put the exemplar MVE 808 there with

the controller up on the arm. That calls for liquid nitrogen to go inside that dewar. And when it does, it helps maintain that temperature where you can freeze human tissue indefinitely. Indefinitely.

Now, the controller also does something that humans simply cannot do. It monitors the samples 24 hours a day, seven days a week, 365 days a year.

The other part of our product that's important is, you've heard this word the dewar; right? It's a phrase, really, for a thermos.

This is a pretty industrial thermos, obviously, because it is performing a very special task, which is keeping samples very, very cold. It has to hold liquid nitrogen.

Now, in combination, the dewar can keep the temperature cold. The computer controller will call for liquid nitrogen to make sure it's maintaining that temperature and level.

Now, you heard me say earlier, Dr. Conaghan unplugged our product.

My client bears the burden of showing to you a defense, and it's called misuse. Under the law, we have to prove to you that the product was misused. And if the misuse was so highly extraordinary, the law tells you, you should consider that as the sole cause of the plaintiffs' harm. The sole cause.

But notice that the law says "consider." We respectfully submit to you we will prove that they misused this product in

such an extraordinarily unbelievable way that you should consider it. But we're not going to stop there. We're going to call witnesses to prove that PFC is the actual cause of any of the damage to the tissue.

Now, let's talk about those facts about how PFC misused the freezer. First, Dr. Conaghan made the fateful decision to unplug a cryogenic freezer with human tissue in it.

Then he began an unusual if not bizarre new monitoring method. He instructed his employees to plug back in the controller, that was alarming, to initiate the fill cycle. He then instructed his employees to go about manually measuring with a dipstick the liquid nitrogen level.

Now, if this was for one day or two days or even three, could you really criticize him? You have to get somebody out there. There's going to be a delay of some kind. Maybe a day, maybe two, maybe three. He began this procedure for 17 consecutive days.

Plaintiffs alluded to you that Dr. Conaghan called; he just didn't show up yet, the service guy.

Dr. Conaghan sent an email 13 days after the -- after the issue arose with the controller. 13 days, on February 28th.

The service technician on March 1 responds and says, "Well what's wrong?" You'll hear Dr. Conaghan testify, when I put it to him, and say, "Why didn't you call and get the controller serviced?" "I don't know, Mr. Duffy. It just didn't get

done."

Fourth, opposing counsel told you that there were no alarms for almost two weeks. And I told you in my opening part of my comments here that that was untrue. It is absolutely untrue.

There were 128 alarms that came from the controller on Chart's freezer that were received by the PFC personnel. And do you know what they did with them? They muted them. They muted 128 alarms in 17 days.

Mr. Ringel is now putting up for us a chart that we have put together for you to simplify this evidence.

You didn't hear about the 17 days in the opening statement of my opposing counsel. It's the critical period of time. February 15 is the day in which the controller begins to not have level. On that day, there are 19 alarms from our controller that are muted. 19 alarms. On the 16th, 17th, and the 18th there are six alarms that are muted; on the 19th there's four; on the 20th there are eight.

And then there's just a gap, which you'll see. That gap means that someone in PFC didn't bother, that day, to plug back in the controller Dr. Conaghan told them to plug in.

We respectfully submit to you, when you don't plug the controller back in you're not filling it. Remember what's in there.

Now, the next day, February 22, there's 13 alarms that PFC

personnel received and mute. And notice now what's happening. One of the alarms on the 13th says "hot gas bypass." "Hot gas bypass."

What does that mean? It means that warm air is now coming in through the piping system at PFC and is blowing into the freezer. It suggests that there's also a supply issue at Pacific Fertility Center that is here as well.

The next day, 23rd, we have seven alarms that are muted by personnel for Pacific Fertility. And, again, what do we see? "Hot gas bypass."

Now, February 24 you're going to notice one other thing. There's no data here. Remember Dr. Conaghan told his personnel, "Plug it back in." Nobody plugged it in.

I respectfully submit to you that on February 24 we will prove to you that no one filled the freezer that day. There are buckets that they can use in these circumstances. Those buckets would have to be carried through four doors, into -- well, you have to go through four doors, go across the hall, fill it with liquid nitrogen, come back through the four doors --

MR. POLK: Objection, Your Honor.

MR. DUFFY: -- pour it in.

MR. POLK: Pursuant to court order, this has been excluded as misleading and confusing.

THE COURT: Not quite. Overruled.

Go ahead.

MR. DUFFY: We respectfully submit to you they did not fill on February 24.

Now, things start to get particularly dire on February 26th. A lab personnel named Kathrin Buchanan mutes 25 alarms. She's also getting two hot gas bypassing alarms at the top.

Now, on the 27th we have 20 alarms being muted with PFC personnel, with more hot gas bypassing happening as well. On the 28th we have hot gas bypassing twice. And 17 alarms are being muted that day. Now, on Friday, the 1st, we have 12 alarms that are muted that day. On Saturday the 2nd, we have 24 alarms -- or Friday the 2nd, 24 alarms muted by PFC personnel. Now, on Saturday the 3rd, the day before the incident we have 14 alarms muted.

We respectfully submit to you we'll prove that PFC misused our product and that you should consider that to be the sole cause. But we will not stop there. We will prove that PFC caused any damage to the plaintiffs' samples.

How will we do that? The only expert who will testify in this case, that has what we would call subject matter expertise, is an individual named Dr. Franklin Miller.

Who is he? Dr. Miller is a cryogenic engineer who comes from a humble background and gets his way into MIT to get a Ph.D. in cryogenic engineering in the foremost cryogenic

engineering school in the country. From there, he goes on to NASA, and he helps build spaceships.

When spaceships go into space and they go through the shadows, they experience cryogenic temperatures; and individuals with Mr. Miller's experience are needed. He has 21 years of experience in designing and manufacturing cryogenic dewars.

You heard about the name from the plaintiff, Dr. Kasbekar. He is not -- he's not a cryogenic engineer. He has never designed a cryogenic vessel before. But he has opinions about this.

Now, Dr. Miller will tell us that our cryogenic dewar is, in fact, reasonably safe, that it did not cause the sample -- any damage to the samples. And I'll get into more detail about his testimony on that.

I will also bring in Dr. Grace Centola. Grace Centola is a high-complexity lab director who, like Dr. Conaghan, runs a reproductive lab. She will testify that Dr. Conaghan deviated from the standard of care, as the lab director, in running Tank 4 the way he did for 17 days.

There will not be an expert from the plaintiffs to defend what Dr. Conaghan did. Not one expert. Dr. Conaghan will defend himself.

Next, when we heard there were 17 days, when we heard there was this manual measurement policy, something struck us

as odd, so we hired a retired FBI agent to get into the data. You'll hear from him too. His name is John Cauthen.

Now, one of the things that Grace Centola will help you understand is how what PFC did caused any damage to the plaintiffs' samples.

One of the things that PFC has, that all labs that store cryogenic -- or that store human tissue, they have to have a backup freezer. Why? If there's a functionality issue, if something needs to be serviced, you have to have a backup.

Thankfully, PFC had a backup freezer. It's one of our own products. It's an MVE 808, and it's sitting in the basement of Pacific Fertility. And when this happens on February 15, the testimony will be that no one went to get it.

You know the day they went there to get it? It was March 4. It's still being used today at PFC, the backup freezer.

Now, Dr. Centola will help us understand if you just go get the backup freezer in the basement the samples are saved. But for 17 days they didn't do that.

Two, they also don't call for service for the 17 days.

Now, another thing that you'll hear in this case, there's going to be three lab directors that you will hear testimony from on the stand. All three have a written policy. And it's really, really important. And it means that every freezer holding human tissue must be connected to the alarm system all

the time, without exception.

In PFC, Dr. Conaghan had a quality control manual. And this is where he writes down this policy. And Mr. Ringel will show us, now, Section 3.10. This is the policy that Dr. Conaghan wrote for his own lab. Notice what it says.

> "All critical laboratory equipment and liquid nitrogen storage tanks are to be linked to an appropriate alarm system."

And then point 2 is the liquid nitrogen tanks, sperm and embryo storage tanks.

Now, toward the last paragraph Dr. Conaghan wrote:

> "The laboratory alarm system is linked to several cell phones and home phone numbers, laboratory director" -- that's Dr. Conaghan -- "medical director, embryologists, and is monitored 24 hours a day, seven days a week, 52 weeks a year, holidays included."

When an instrument or tank goes into an alarm state, there is both a local, which is the audible alarm you hear from the freezer, and a remote signal to the laboratory director's cell phone.

So notice what Dr. Conaghan did when he decided, on February 15th, "Ah, it's alarming, I'm just going to unplug it." When he does that, he violates his own policy. He has disconnected the human tissue from 24/7 monitoring. He then begins a policy that, frankly, doesn't make sense. He

instructs his subordinates to plug it back in. Every day, just plug it back in.

That's misuse. If our product is not functioning correctly, call someone or go get the backup freezer. Don't keep using it.

When they plug it back in, what they're looking for is to not have to carry liquid nitrogen manually and pour it through the top. They want to use the piping system in the lab. So they plug it in so it will initiate a fill cycle, and then liquid nitrogen that they actually need will flow into Tank 4.

Now, the next thing he had them do, because the controller wasn't accurately measuring the amount of liquid nitrogen, was to use one of these (indicating). This comes with our product. It comes with the Chart freezer, and it is used by personnel.

And Dr. Centola will help you understand this. They use this so that you can measure liquid nitrogen before you fill and after you fill. Why? You want to keep recording the amount of the liquid nitrogen consumption.

But PFC doesn't do it that way. Instead, what they had is a policy where they would hit the fill cycle on the computer, let the fill cycle run its course, and then they would come over and look at the computer, and they would just write down the number of what the level was.

Now, if the controller is not functioning correctly in that regard, they replace it with this (indicating).

Now, what we've put up here on the screen is a blowup of the actual sticks. And this is one of the ones in Pacific Fertility on March 4. This picture shows you a couple of things.

If you believe the PFC personnel on this case, they will testify that they -- they measured every day. If they did, they were holding in their hands a telephone number they could have called. That's our number. But, instead, they just keep stabbing it in there, allegedly, taking measurements.

This whole procedure that Dr. Conaghan enacted for 17 days after the incident is a deviation from the standard of care of a high complexity lab director. Dr. Centola will help explain to you this is so extraordinary what he did. And, again, there will be no one here to defend Dr. Conaghan but himself.

Now, the other way that we will prove to you that the actual cause of any damage to the patient samples comes from the fact that the PFC personnel, despite being told by Dr. Conaghan, did not fill and measure as they were verbally instructed to do.

Now, we have put together a timeline to help you understand what we have learned. Remember that on February 15, we have the incident where Dr. Conaghan unplugs the freezer. On February 15, there is no measurement for liquid nitrogen on the day he unplugs the freezer.

On February 21st, the controller is not even turned on, so

they're not filling. On Saturday, February 24, the controller is not even turned on. They're not filling. On February 28, there is no measurement, whatsoever, for a liquid nitrogen level in Tank 4.

That, ladies and gentlemen, is simple proof that they didn't fill and they didn't measure.

Now, what we also know is, during that 17-day period of time I was talking to you earlier about, the hot gas bypassing alarms have fill time errors, fill time issues.

You'll hear testimony from the stand, it should take 20 to 30 minutes to simply add 1 inch of liquid nitrogen to Tank 4. The fill times on this or so extraordinary, some of them are as long as 2 hours and 36 minutes.

There's something wrong with the supply of liquid nitrogen in the lab. We have fill times on February 26 of 2 hours and 25 minutes. On February 27, we have fill times of 2 hours and 18 minutes.

And then as we get close to the incident, we begin to see more concerning evidence of fill time problems. On March 1st, 1 hour and 50 minutes. On Thursday, March 2nd, we have 2 hours and 36 minutes. And then on the day before the incident is discovered, Saturday, March 3rd, we have a fill time of 1 hour and 56 minutes.

You will hear from the stand Dr. Conaghan admit that he never investigated what was going on with the LN2 supply in his

lab in late February and early March. He didn't investigate it.

Now, how did I learn all of this? How did we learn all of this?

We had to work pretty hard. Why? Because PFC covered all of this up. Why did they do that?

The incident happened on March 4. And an incident as serious as this one requires action from regulators, and they're coming to PFC to inspect the facility.

The entity is known as the College of American Pathologists. They help regulate labs that store human tissue. They're coming on March 27th.

Now, you will hear testimony from Dr. Conaghan and one of his embryologists. Her name is Gina Cirimele. To prepare for this inspection by the College of American Pathologists they need to get ready. And when they do, they discover what I showed you, is that the LN2 measurements are missing.

That's not good. That's not good for PFC. So Dr. Conaghan, the evidence will show, he told Gina Cirimele to fill in what she could. That's human tissue in that freezer.

So on March 20, 2018, Ms. Cirimele goes about backdating LN2 measurements in Tank 4 for three days; February 15, February 28, and March 4.

She also makes alterations to comments that go into this software. In one of those changes she makes it alludes to a

problem with the LN2 supply.

So how did I -- how did we figure this out? Data. Two sources. Our controller contains memory device, like a black box on a car or a plane, and it keeps operational data of what's happening with our product. We went there first.

MR. POLK: Objection, Your Honor. Reference to black box has been excluded, pursuant to court order, as misleading.

THE COURT: Sustained. Go ahead.

Ladies and gentlemen, remember this is just oral argument, not evidence.

Go ahead, Mr. Duffy.

MR. DUFFY: Thank you.

The memory device in our controller helped us learn, one, they didn't plug it in. Two, 128 alarms were muted by PFC personnel. 128 alarms. Three, we have very, very long fill times that are very concerning and, of course, the hot gas bypass alarms which are bad, are just bad.

Now, the next thing. Where did we find the other data to prove this? This is where I had to hire the FBI agent to help us.

So personnel at PFC would enter into a database program, known as Reflections, the measurements that they were supposedly making.

Mr. Ringel, would you have it up. Thank you very much.

So what we put in front of you here is what PFC told the

world. Look at every single one of these days, ladies and gentlemen. Do you see a measurement? Yeah. That wasn't true.

They produced this document in a PDF format. Not in a native format; in a PDF format. The digital evidence was not there. So investigation was conducted.

Please turn to the next page.

We asked for the lab schedules at the lab. And there's a measurement attributed, on February 23rd, to a lab technician named Hana Lamb. She's not even scheduled to work that day.

We know for the data download that was done for the memory device on our controller that the individuals were putting measurements on February 21 and February 24 didn't even turn on our controller. Begging the question: Where do you get liquid nitrogen from?

Next slide.

And on February 15, we now know because we got to the metadata. What happened on February 15? Gina didn't measure on February 15. This measurement she puts in on March 20. March 20, over a month later. In the original metadata it's blank.

February 28 Gina's back at it again supposedly measuring 12.3 inches. That's not true. That number is entered on March 20. The real evidence is that it was left blank.

Now, I was talking earlier about these measuring sticks which are really supposed to be used to calculate LN2

consumption of the dewar.

These measuring sticks are measured in eighths. In eighths. Remember, they're supposedly using these to measure.

On February 17 Gina's back at it again, and now she's measuring in tenths of an inch. Not eighths, which is what the measuring provisions are of this measuring stick.

Then Anya's back on February 21. And remember February 21's the date they don't turn on the controller. Anya's putting in a measurement in tenths.

February 26 Kathrin is putting in 13.3, in tenths. This measures in eighths.

Finally, February 28. Think about this. This is one of the ones that's blank. It's blank. Gina comes in and measures in tenths, backdates it in tenths.

Now, the data download that we did from our controller also helped us learn about the fill times that I discussed with you earlier. And you'll notice this concerning trend, really, in late February.

And I'll start here on the 27th, with Kathrin, a 2 hour and 18 minute fill. Gina, February 28, 55-minute fill time. March 1st, Jean, 1 hour and 50 minutes.

Now, on March 2 we have two fills, for a total of 2 hours and 36 minutes. It's supposed to take 20 to 30 minutes.

Saturday, the 3rd, very important day in this case, Gina now is trying to fill, and she is recording -- what we have in

the data is she's actually taking an hour and 56 minutes to fill the freezer.

Again, remember, Dr. Conaghan is going to tell us, "Mr. Duffy, I didn't investigate whether there was a supply issue after all this happened."

Now, let's go to the next slide. Here is the truth: Of the 17 days that Dr. Conaghan deviated from the standard of care in this measuring regimen that he started, there are only four days where there is no evidence undermining substantially that any of this work was done. That's in white.

In red, that's all the things that I've covered. Not turning it on; not measuring; backdating; measuring in tenths. And remember, this is what they told the world. "We measured every day."

Now, Ms. Sharp had told you about the controller. Notice the one thing that the controller has that has a fail-safe design. And you will hear about that in this case.

A fail-safe design is a design that's used when human life is involved. It really comes from the nuclear power industry but was later adopted by automakers and aircraft manufacturers and those that work in space. Why? Because they carry people. So if a part of the system is not functioning correctly, a fail-safe design is supposed to alert you of that problem.

Ms. Sharp told you there were no alarms for two weeks. That's just simply not true. The controller is telling them

128 times do something. Please.

When Dr. Conaghan unplugs Tank 4, the fail-safe design is disabled. You will hear evidence from the stand of the PFC personnel who will admit that when they did that they converted it to human monitoring.

Remember what our product can do 24/7, 365 days a year. So if you get the backup freezer, that's what you get. But, instead, manual monitoring is what's chosen.

Maybe it's an hour a day they peek at them. Maybe they measure once a day. Maybe. It's totally different than having a backup freezer, that looks just like that, to move them into.

Now, when he unplugs that and disables our fail-safe system, he does something unusual. He instructs them, of course, to plug it back in. And that's where the alarms come in, and they're muted and ignored.

There's a way to go on there and mute it. But there's a timer on it because if you mute it they're not -- our designers are not saying, "We'll just let it sit. That's fine, you can turn it off." No. It will come back. And that's why you see in that chart so many of them being muted. They're coming back saying, "Do something." "Do something."

Now, you heard Ms. Sharp say that there was a problem with our weld. And, ladies and gentlemen, that's just simply not true. Tank 4, that's sitting there in front of the jury box, that's what it looked like two days after they pulled the

samples out of it. Two days. And there's a photograph of it.

Now, it is our position in this case that the weld that you saw with the bubbling and the crack in it and everything, that occurred after it imploded, after the samples were pulled out of it.

Dr. Miller, the NASA -- former NASA scientist, will be able to help us understand that, based on photographs taken by Dr. Conaghan, that the dewar is maintaining its vacuum seal on March 4.

Now, as part of his training at MIT, studying under one of the most preeminent cryogenic engineers in the world, Dr. Miller got to learn about welding. And he will tell you that in a cryogenic vessel you apply only seal welds. You do not apply full-penetration welds.

Full-penetration welds do not work with a cryogenic dewar. The thin metal of the inner part of the vessel cannot be penetration welded. Dr. Kasbekar did it, but even he will admit that he got burn-through as part of it.

Now, Dr. Miller, before he ended up going to MIT, ended up working at a boiler manufacturer as a design engineer. And there, in that industry, you must have full-penetration welds. Why? Because pressure vessels are dangerous, and if you don't have full-penetration welds they can explode.

But cryogenic dewars only need seal welds. And, in fact, it's best for the functionality of the product that only seal

welds with thin metal be used.

Now, we're also going to bring to you a metallurgist named Ron Parrington. He's going to be able to look at the weld and help you understand how Dr. Kasbekar is wrong. That's the plaintiffs' metallurgist; he will testify too.

And in Ron Parrington's conclusions we have a sudden failure of the dewar after it implodes. That's two days after the incident. And he calls it monotonic ductile overload.

Now, Dr. Kasbekar has a different theory. He says the fill pipe where this weld is expands and contracts based on a thing called thermal cycling. He's just wrong.

Now, what we know from Dr. Miller's work in this case is that there is a very small leak in Tank 4.

After 60 months in service, an end user like PFC is supposed to dry out our freezer and then inspect it for problems. PFC didn't do that.

So what Dr. Miller thinks is the most likely small leak that we have in our dewar is at a thing called the O-ring port. And that has a polymer that goes around the O-ring that if that starts to get old it will crack. And that's something that you need to look for and then replace if necessary.

Well, after this incident, PFC hired engineers, and they inspected the freezer. And they didn't invite my client, and they didn't invite their own patients either. And they took off the O-ring so no one can test it.

But Dr. Miller thinks it's the most likely small leak that we have.

Now, there's a design inside our dewar that is there to catch small leaks. It's called a molecular sieve, which is fancy, and I'm just going to refer to it the way that witnesses in the case talk about it. It's a getter. What does it do? It gets leaks.

Because all dewars are going to leak. It's part of the process. And in this pan at the bottom, in the center of our design, this molecular sieve is taking in the small leaks. Now, when it does that, the leak will start to increase the pressure inside the vacuum space.

Now, Dr. Kasbekar says that there's a crack in a weld that will cause this pressure buildup. We will show you that is not, in fact, what happened.

Would you please play the thermal pressure animation.

(Animation played.)

MR. DUFFY: As you can see in this animation, what we've done is shown you how our product looks. And then if you open the first outside layer you can see these two fill lines here; the fill line and sensor line. Those are the two lines you see protruding out of the top of the exemplar; one that we've brought here.

Now, as we keep going, we open up the inner vessel. And you can see in white that's our liquid nitrogen. Now, as we

keep going, you can see the vacuum space on the other side. And here's this fill line that we have and this weld that Dr. Kasbekar thinks is what happened caused the problems here.

Now, as we go through this, this is Dr. Kasbekar's theory, and he thinks this crack is going to cause a leak of liquid nitrogen into the vacuum space and that that is how the liquid nitrogen gets out of the inside of Tank 4 and into the vacuum space.

But the problem with that is -- and Dr. Kasbekar's doing the best he can. He's not a cryogenic engineer. He doesn't design dewars.

What he really doesn't understand is the vacuum space is pressurized. So what happens when you do have a leak? Even if he's right; and this is only if he's right. watch what happens. The interior pressure in the vacuum space pushes back the leak back through the crack and creates equilibrium.

How do we know that? Dr. Miller. Dr. Miller does understand vacuum space, does understand pressures, does understand heat transfer, does understand thermal dynamics, because that's what he does.

Now, an important photograph was taken by Dr. Conaghan on March 4. That photograph is him hanging over the top of Tank 4 on the Sunday when he discovers the incident.

Notice here it doesn't look like what's in front of you. It looks more like the exemplar, with one small thing. There

is a small evidence of a buckle. Now, that buckle proves to Dr. Miller that the dewar is holding and the samples are inside.

So what happened? All that evidence I just showed you of them not measuring and them not filling, that has an impact on the science. When you don't fill and you don't measure, the inside of the dewar begins to warm up.

If we have a small leak and it warms up, the vacuum space is going to get gas in it because the getter, itself, is going to, what Dr. Miller says, outgas.

So remember what our getter does. It's getting these small leaks that happen all the time in a cryogenic dewar. Once it warms up, though, it's going to have gas coming out of the top and increasing the pressure.

We've got another demonstration for you so you can see it.

(Animation played.)

MR. DUFFY: This is our outer vessel. And then we peel it back to show you an inner vessel. That's our sensor line where we can monitor the LN2 level and the temperature. And here's the fill line. This is connected to the supply of liquid nitrogen.

Now, we peel back the inner layer to show you the liquid nitrogen. And notice the blue-purple thing underneath it. That's the getter. That's our molecular sieve. And you see the yellow is the vacuum space.

Now, because we have a small leak somewhere, and it's warming up because they let this thing go dry, the molecular sieve begins to outgas. This is its normal operation where it's bouncing back and forth with a one-inch evaporation every day on a fill.

But then watch what happens when it goes dry. Now, here's the picture here, obviously showing it's picking up some of the other material that's coming into the vacuum space. Now it's drying out.

Now that tray with the molecular sieve is what Dr. Miller says is outgassing. There's your pressure. Now, watch what happens next. This pressure is coming inside the vacuum space. And as it's pressuring, those fill lines are bending and buckling. And then look where our crack is showing up.

Also, look at one other thing. The false bottom, it's creating an important mark in the case. The false bottom is coming up because of the implosion and leaving a mark at the bottom of the weld.

Now, here's a photo of the fill line, from the inspection. It's bent. And there's the fill line too, bent. That's what causes this crack. And that's what causes that mark at the bottom where the false bottom comes up and dings it. You can see it there.

Now, there is liters or gallons and gallons and gallons of liquid nitrogen in these freezers. And you saw that little

bubble test, didn't you, that were played by the plaintiffs?

If we have anywhere between 120 and 150 liters of liquid nitrogen, how does that go through that crack in 22 hours? How? That's the longest period of time it could possibly have been.

The problem with that is, even if Dr. Kasbekar was right, when a cryogenic dewar loses vacuum seal, it doesn't do so without leaving all kinds of signs and symptoms of it.

What's inside there is extraordinarily cold. So if you lose the vacuum seal, you're going to see water sweating on the outside of that freezer. There's a vent path that's specifically designed in there that when you lose that vacuum seal ice begins to form on the outside of the rim of that freezer. And while its vacuum seal is going, you start seeing a chimney plume of nitrogen gas, and you have water gathering on the floor

Now, Dr. Conaghan will testify that there was no ice on the rim, no big ball of ice, no plume. He's only seeing water at the very bottom of the freezer and a little bit on the floor.

Dr. Kasbekar concludes then that, well, it just must have slipped out that crack in 22 hours. Nobody saw it. Nobody could have picked up on it.

Please show a picture of the lab.

(Photograph displayed.)

MR. DUFFY: This is a tight quarters. Where they work versus where that freezer is, only a handful of feet.

The laws of physics, I submit to all of you, exist in this lab. There is no way you can lose 120 to 150 liters of liquid nitrogen and nobody notices. They're working right there. Look at the desks. Look at the chairs. Look at the computers. But to be believed, it had to evaporate with no one seeing anything.

Now, you've heard me refer to what's in Tank 4; it's human tissue. And it's the human tissue of the plaintiffs.

You met my colleague, Kristine Reveille, during jury selection. She's going to help us bring one more expert in here to help us all understand human reproduction better. And it's Dr. Eve Feinberg, from Northwestern's medical school in Chicago. She's a very well-respected reproductive endocrinologist, and she is going to talk to you about if the plaintiffs came to her, and they were her patients after this incident, what reproductive options do they have.

And Ms. Reveille is a highly skilled medical/legal attorney. She will help us all understand that.

So, ladies and gentlemen, when we finish and you are given the case to deliberate, I'm going to ask you to find that there was misuse of this product, and that that misuse was the cause of any damage to the tissue, and enter a verdict for Chart.

Thank you very much.

THE COURT: Thank you, Mr. Duffy.

Are the plaintiffs prepared to call your first witness?

MS. ZEMAN: We are, Your Honor. If we could have just a moment to set the podium up.

MR. LOTHSON: Your Honor.

THE COURT: Yes.

MR. LOTHSON: There was an admissibility objection at one of the exhibits with Dr. Kasbekar that was never addressed. And we were going to talk about that before trial started every day.

MS. ZEMAN: I believe that exhibit has actually been addressed for use by Dr. Kasbekar. It's Exhibit 208. And I believe the Court has ruled that it is admissible for his use.

MR. LOTHSON: No. Also, Exhibit 192, if we could --

THE COURT: 192 has been -- I ruled on as well.

MR. LOTHSON: And 208? It's not the subject tank. It's a different tank.

MS. ZEMAN: Your Honor has ruled on both 208 and 192 and allowed both them to be used.

MR. LOTHSON: Your Honor, I think that each morning we were going to plan to talk about exhibits for today.

THE COURT: That's right. We were together this morning. It wasn't raised with me.

MR. LOTHSON: Well, we went right to --

THE COURT: Let's go on. And we're going to take

another break at noon, in any event.

MR. LOTHSON: Thank you, Your Honor.

THE COURT: But 192, I know, has -- was overruled.

MS. ZEMAN: Before we call the witness, Your Honor, I think we had talked about preadmitting some exhibits.

THE COURT: Yes.

MS. ZEMAN: If I could move to preadmit a long list here, those will be Exhibit 1, Exhibit 4, Exhibit 5, Exhibit 68, Exhibit 118, Exhibit 121-A through B, Exhibit 122-A through F, Exhibit 126-A through S, as in Sam, Exhibit 130-A through Z, Exhibit 131-A through I, Exhibit 134-A through F, Exhibit 192, Exhibit 208, Exhibit 272, Exhibit 528, Exhibit 531, Exhibit 532, and Exhibit 533.

THE COURT: All right. Except for Exhibit 208, which we'll hold in abeyance for the moment, is there any objection?

MR. LOTHSON: Besides 208, no.

THE COURT: Okay. All right. Those exhibits -- I'm not going to repeat -- are admitted.

Just so you know, members of the jury, the parties have worked very hard so that at the beginning of a witness we can just admit all the exhibits at once, so we don't have to take the time during their testimony.

And 208 we'll discuss at the break.

MS. ZEMAN: Understood.

And, in addition, we have prepared two demonstratives that

have already been shared with defendants. Can we go ahead and publish those as needed, or do we need to ask permission?

THE COURT: No, you can publish as needed.

MS. ZEMAN: Thank you.

Plaintiffs would like to call Dr. Anand Kasbekar to the stand.

THE COURT: Good morning. And we do actually have a clear mask that you can put on. And this will be a test to see if you put it on the right way.

(Laughter)

(Pause.)

THE COURT: I think that looks correct.

THE CLERK: Sir, can I have you raise your right hand.

ANAND KASBEKAR,

called as a witness for the Plaintiffs, having been duly sworn, testified as follows:

THE CLERK: Can state your name and spell your last name for the record.

THE WITNESS: Yes ma'am. It's Anand Kasbekar. Last name is spelled K-a-s-b-e-k-a-r.

THE COURT: Thank you.

DIRECT EXAMINATION

BY MS. ZEMAN:

Q. Dr. Kasbekar, could you introduce yourself to the jury.

A. Yes. My name is Anand Kasbekar, and I am a mechanical and

materials engineer.
Q. Dr. Kasbekar, how did you become involved in this case?
A. I was contacted in, I think it was April of 2018, and asked to assist in analyzing a cryogenic tank that had failed and was involved in the loss of some human tissue that was stored in the tank.
Q. Were you asked to conduct a failure analysis of Tank 4?
A. Yes, I was.
Q. Why are you qualified to do a failure analysis of Tank 4?
A. For -- since about 1985'ish, I have focused on mechanical engineering material science with a subspecialty of forensic engineering and failure analysis.
So for the past 30, almost 35 years or more, I have engaged in looking at broken pieces of equipment from a wide variety of structures and mechanical devices. And my specialty is essentially in looking at the features of the broken equipment and trying to determine what the root cause of the failure was.
Q. Do you hold any degrees relevant to helping you to do that?
A. I do. I have an undergraduate degree in mechanical engineering, a master's degree in mechanical and materials, and a Ph.D. also in mechanical and materials.
Q. Do you have any teaching experience?
A. I do. Starting after I received my Ph.D., in about 1995,

I took an adjunct position teaching at Duke University in their School of Engineering.

Q. How long did you teach at Duke?

A. Between about 1995 and 2015 or so.

Q. What did you teach at Duke?

A. I primarily taught a class called Failure Analysis and Prevention. I also taught some introductory engineering classes sometimes, but my main role was to assist in the Failure Analysis and Prevention class.

MS. ZEMAN: If we could please look at Exhibit 68.

(Document displayed.)

BY MS. ZEMAN:

Q. Do you recognize this document, Dr. Kasbekar?

A. I do.

Q. What is it?

A. It's a copy of my curriculum vitae.

Q. Is there anything in particular within your CV that you'd like to highlight for the jury?

A. I would point out that -- I don't know if this is in my CV, but in addition to teaching that class, when I was in graduate school for several years I was also the lab instructor for the Failure Analysis and Prevention class.

Over the years I've been a member of a number of professional societies, primarily the American Society of Mechanical Engineers, and then, also, the Materials Information

Society and the Metallurgy Society.

MS. ZEMAN: We can close that exhibit.

BY MS. ZEMAN:

Q. Dr. Kasbekar, have you done any work for the United States Army?

A. I have.

Q. What did that work entail?

A. Uhm, I've started a company in about 1995, after receiving my Ph.D., and we received a number of research contracts with the Department of Defense, primarily on developing design tools for analyzing head-mounted protective equipment.

Q. In getting back to your involvement in this case, was anyone else involved in evaluating Tank 4?

A. Yes.

Q. Who else was involved?

A. There were engineers working on behalf of Chart as well as engineers working on behalf of PFC. All were involved in the investigation we did of the fill tank.

Q. Why were multiple parties' engineers involved in that investigation?

A. Well, it's a normal practice when you have a failure in a large loss like this. But at some point it was evident to me, and I believe to the other parties, that we would likely need to do disassembly and destructive testing to determine how and why this tank failed. And when that's done, all parties have

some say in how that -- how we go about doing that.
Q. Through your failure analysis of Tank 4, were you able to conclude what caused its failure?
A. Yes, I was.
Q. And what did you conclude caused that?
A. I concluded that a crack in the lower half of the fill port weld had occurred over time due to cyclic loading of that weld.
Q. Did that cause a loss of vacuum in Tank 4?
A. Yes.
Q. Had you worked with cryogenic tanks before you became involved in this case?
A. I have.
Q. In what capacity?
A. As a user of cryogenic tanks.
Q. Did you use them during your research for the Department of Defense?
A. We did. Some of the materials testing we did for our work involved low-temperature testing of the strength of certain materials. And in order to do that, I had to build a chamber that we could put in a tensile test machine that could be cooled and heated. And we used liquid nitrogen as a cooling media.
Q. Did you use cryogenic tanks in any other capacity?
A. Yes. For my research at Duke University, and also in the

failure analysis lab, we have a scanning electron microscope with what's called an EDX probe. And that device required being maintained with liquid nitrogen in order for it to operate properly.

Q. How does a cryogenic tank keep things cold?

A. The cryogenic tank is actually a fairly simple device. It's very much like a thermos with a high vacuum that is between the inner and outer tank. And the vacuum is a -- provides the insulation.

In addition, cryogenic tanks also have a -- it almost looks like a space blanket, but a foil and insulative wrap around the inner tank. So it's a very high-end thermos.

Q. Dr. Kasbekar, is that very similar to the thermos that was displayed in the opening statement?

A. I don't know if it's very similar, but it certainly is similar. And the structure is essentially equivalent.

MS. ZEMAN: Could we approach to provide him with that demonstrative?

THE COURT: Yes.

THE WITNESS: Thank you.

BY MS. ZEMAN:

Q. So to recap, did you describe there was an inner vessel and an outer vessel?

A. That's correct.

Q. Can you show us that on the thermos?

A. Yes. Trying to figure out where the -- okay.

So just like a thermos or your insulated coffee cup, there's an outer vessel, which is a shiny blue piece of metal called -- it says "Thermos" right on it.

And then I've cut away a portion of the outer vessel. And there's an inner vessel, which is this stainless portion right here.

And the inner vessel in the cryogenic tank in front of you, basically, it's suspended from the neck, from this area right here. And in between the inner and outer vessel is the vacuum space, which is below and all around the inner vessel.

Q. And why is vacuum space a part of that thermos?

A. So when you don't have air or gas in there, it's a very efficient insulator because of the manner in which heat is transferred between the ambient environment and the inside environment. If there's no air, there's no molecules, and there's no way for the heat to be transferred.

Q. What model is Tank 4?

A. It's an MVE 808, made by Chart Industries.

MS. ZEMAN: If we could pull up the demonstrative that shows us the anatomy of the tank.

(Photographs displayed.)

BY MS. ZEMAN:

Q. If you could, first of all, talk about these first two photos. What do these two photos show us, Dr. Kasbekar?

A. So the photo that is on the left shows the -- a replacement tank. And the vials that you're looking at are contained in metal boxes. And those are the thousands of eggs and embryos that are stored in the tank. And then the image to the right of that is the ultimate condition that Tank 4 ended up buckling and deforming into.

Q. Dr. Kasbekar, is this an exemplar of the boxes that would have been stored in Tank 4?

A. Yes, it is. And in that photo you're actually looking down at the very top of that box. And multiple boxes, actually.

MS. ZEMAN: If we could go to the next slide.

(Demonstrative displayed.)

BY MS. ZEMAN:

Q. What are these images showing us?

A. So these are renderings that from left to right show a normal tank. And we've turned the outside of it transparent so that you can see the inner vessel as well as the vacuum space. And then we've highlighted a 26-inch section of line, which is the fill line for this tank. Unlike a thermos, you can fill this tank with liquid nitrogen from an external source.

And then the middle image is showing you essentially the inside of the tank as it existed after it deformed. And then to the right you're seeing another rendering of the inside of the tank after it deformed.

And these renderings are based upon data collected on the subject tank to document the deformed geometry of the tank.

Q. To a layperson are these sort of, effectively, x-rays showing us the internal inner vessel as it currently looks?

A. That's exactly what it's doing. It's showing you the comparison the way it should look and the way it looks due to the deformation that occurred in Tank 4.

MS. ZEMAN: If we could go to the next slide, please.

(Slide displayed.)

BY MS. ZEMAN:

Q. And, Dr. Kasbekar, if you could walk through the different components of the Tank 4 for the jury, please.

A. Absolutely.

So the first thing, if we go from top to bottom, is there's a Styrofoam lid. It's essentially 8 inches thick. And it does have a provision to allow gas to escape from it. And that's because, otherwise, this gas would pressurize if it could not evaporate off. So there's actually a part of the lid that does not normally seal up against the tank.

Go to the next slide, please.

The next slide we've highlighted in yellow the inner vessel, which is essentially what I have shown in this -- with the thermos.

And in the upper right-hand corner is a photograph of a Chart tank that is undamaged but with the outer skin or the

outer tank removed. So, essentially, what you're looking at now, if I use the thermos as an example, we have essentially taken this outer skin, cut it along the top edge and pulled it off so we could see what's inside the tank.

And what you're seeing there are two vertical lines. One is the fill line and the other is a sense line or sensor line.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: That's just a shot of the outer tank with the control box mounted to the side.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: Here what we've done is simply highlighted the inner space between the inside tank and the outside tank, and that's the vacuum space that we've been talking about this morning.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: What we're showing here is essentially the inside of the tank and the tank contents. The blue liquid is intended to depict the liquid nitrogen in the tank, which typically ranges from up to about 14 inches or so when it's filled.

And then the metal boxes that hold the canes and cryotips that store the eggs and embryos are shown below that. They're

the metal boxes with the circular openings in them.

BY MS. ZEMAN:

Q. Dr. Kasbekar, do those samples sit directly on the bottom of the inner vessel?

A. No, they don't. There's actually something called a false bottom or a shelf, which is a flat piece of metal. And it's placed in there because the bottom of the inner vessel is actually curved, very much like in this thermos. So it's got a rounded bottom. And then they put a shelf in there so that the samples will sit flush on the shelf.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: So what we're looking at now is the underside of the inner tank. So I'm going to keep going back to the thermos because I think it's clear. But we're looking at the inner tank. And underneath of it there's a sieve pan that is tack welded or spot welded in several places that holds the sieve material that the attorneys had spoken about earlier. It's sometimes called a getter. It looks a lot like kitty litter.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: What we're showing here is the underside of the tank. And you're seeing the casters, but we've highlighted in both the photograph and the rendering what's

called the vacuum port.

And that's what Chart uses to suck a vacuum on the tank when they initially manufacture it. And then it's plugged with an O-ring seal and a cap.

It's important to understand that that vacuum port is on the outside of the vessel. It's not exposed to liquid nitrogen unless the inner vessel leaks.

This is a picture of me when I was inspecting the vacuum port and also taking measurements of the diameter of the vacuum port.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: This is a controller that was talked about earlier this morning that's sitting on the exemplar tank. It's the electronic portion of the tank.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: Next slide is pointing out, again, the fill line, which is an important component to understanding how this failure occurred.

And the fill line is a stainless steel tube about three-eighths of an inch in diameter. And when the tank calls for nitrogen or the lab staff pushes a button to fill the tank with nitrogen, that nitrogen flows down that fill line and into the bottom of the tank, through the port where we had the weld

failure.

MS. ZEMAN: Next slide.

(Slide displayed.)

THE WITNESS: So what we're showing you now is the fill port that's at the bottom of the fill line. And in the upper right-hand corner you're seeing the vacuum space. And I think I can maybe highlight on this screen. Yeah.

So this area right here -- not going doing a great job -- is all vacuum space. And then this area here is where the liquid nitrogen resides.

BY MS. ZEMAN:

Q. I'm not sure that's coming through.

A. Okay. It's showing up on my screen.

Q. My apologies. I can't see it, but it is on the main screen --

A. Okay.

Q. -- so proceed.

A. So, basically, you're seeing a section through the inner wall. The right side of that image that I've marked up green first is the vacuum space side, and then the left side is the liquid nitrogen space side.

And in the photo below we're showing you a view looking from the inside of the tank directly at the fill port. And the weld in question -- actually, this might be the sense port. But the weld in question is -- this is an awful drawing, but

it's that circular weld around there.

Q. And the last image, is that just --

A. The last image is a close-up of the fill port. And we're looking at it from the vacuum space side. And that fitting is the elbow fitting that was talked about earlier today.

Q. I believe that is the last slide.

Oh, is there one last image to point out?

A. We're just pointing out the sensor port, which is identical to the fill port in construction. They're both made the same way.

The big difference -- and this is an important difference -- between the fill port and the sensor port and the fill line and the sense line is the fill port has liquid nitrogen flowing through it; so the entire line gets cooled when liquid nitrogen comes into it.

The sense port is just there to monitor the level of the liquid nitrogen. So the majority of the time the sense port tubing is just filled with air inside a vacuum space. And the lower part of the sense port means nitrogen in it.

MS. ZEMAN: We can close out that demonstrative.

BY MS. ZEMAN:

Q. Now that we've had that backgrounds explaining the tank components, can you walk us through your failure analysis of Tank 4?

A. Yes.

Q. When did you first exam it?

A. The first examination was in the fall. I think it was September of 2018.

Q. How many times did you end up personally examining Tank 4?

A. There were three separate occasions. Each occasion spanned over two to three days.

Q. When was the second inspection, roughly?

A. It was in the September-October 2019 time period; about a year later.

Q. How many days did that testing session last?

A. That was a 2-day session.

Q. And then was there a third inspection?

A. Yes. That was in March of 2020. And that was a 3-day inspection session.

Q. Were representatives from Chart present for all three testing sessions?

A. Yes.

Q. What did you observe about Tank 4 during that first examination in 2018?

A. I observed there was extensive buckling of the inner tank.

MS. ZEMAN: If we could please look at Exhibits 134-A through D. If you could cycle through those briefly.

THE WITNESS: Give me a second to navigate the mask and the water bottle.

(Photographs displayed.)

THE WITNESS: So what we're looking at, this is Tank Number 4. The controller has been removed from it. And we're looking down at the inside of the tank. And you can see there's very extensive crumpling, buckling, and deformation of the inner tank wall.

BY MS. ZEMAN:

Q. Were those photos taken before any destructive testing was done to Tank 4?

A. That's correct.

MS. ZEMAN: Is there two more photos? There we go. And one more.

(Photographs displayed.)

THE WITNESS: So this is, again, showing the inside. This is a top down view. It shows the false bottom, which is a the flat surface in the bottom. The wiring going down there are temperature probes. It's essentially, again, showing the significant deformation. What might be noteworthy is the deformation is more significant on the opposite side of the fill and sense ports.

MS. ZEMAN: We can close out those exhibits.

BY MS. ZEMAN:

Q. Was anything done to Tank 4 during that first examination other than documenting its condition?

A. No. The purpose of the examination was to allow all the engineers and experts involved to view the tank, photograph it,

videotape it prior to doing in sort of destructive testing.

Q. Were you able to draw any conclusions about Tank 4's failure from that examination?

A. The only conclusion I could draw is it appeared that vacuum space, instead of having a vacuum in it, had become pressurized.

Q. Is that what led to the buckling and deformation?

A. There was little question in my mind, at that point, that pressure inside of the vacuum space had led to the deformation and buckling of the tank.

Q. What did you want to do next in your evaluation of Tank 4?

A. The next step was to leak test the tank to determine if we could find any locations where there was a leak into the vacuum space.

Q. Why did you want to look for a leak?

A. Well, it wasn't just me, but all of us were interested, all of the engineers were interested in determining whether or not there was a leak in this tank. Because a leak in the tank would explain loss of insulation, because you'd lose your vacuum.

Once you lose your vacuum, your thermos is no good. If you have a very old thermos, that's years old or cracked, it's not going to keep things warm or cold the way it used to.

So we were looking for a leak that would explain the compromised vacuum space. We were also looking for a leak that

would explain liquid nitrogen getting into the vacuum space because we know when it gets in there it expands and it could be easily responsible for the extensive damage that we see to the tank.

Q. Were all further steps to examine Tank 4 done by agreement of the parties?

A. Yes.

Q. What generally took place during the second examination of Tank 4 in late 2019.

A. It was primarily leak testing. I'd say the bulk of the first day was devoted to leak testing using a helium-leak-detection system and a sensing probe.

Q. How did the helium leak test function?

A. So the helium leak test that we all agreed upon for this tank involved basically putting a small amount of pressure into the vacuum space through the vacuum port that we showed you earlier.

So the vacuum port is on the outside. We plumbed in a helium tank and allowed a small amount of pressure to fill up that vacuum space. And then we used -- it's a mass spectrometer, but basically it's a sniffer. It's very sensitive to helium. And it's got, like, a pencil-point probe.

And a technician or another engineer working at the facility probed all around the outside and the inside of the tank, looking for helium. And the reason we use helium is

helium is a very small molecule, so even the tiniest of leaks helium can get through.

MS. ZEMAN: Could we see Exhibit 131-A.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What is this a photo of?

A. It's a picture of the engineer or technician using the sniffer probe to look for evidence of helium leakage.

Q. During this helium leak test, did you focus on any particular or you collective focus on any portion of the tank?

A. We sniffed the entire tank, but we paid particular attention to all the external and internal welds, and particularly to the interior welds.

Q. Why was there particular attention paid to the interior welds?

A. Because, again, welds are an area of concern. They're where parts joined together. The materials are not homogeneous; they're not the same. So it's a likely place for a problem. That's one reason.

The other reason that we looked in the interior is because, again, a breach of the interior, whether it's in a weld or in the wall, would explain liquid nitrogen entering into the space between the inner tank wall and the outer tank wall.

And if that liquid nitrogen can accumulate in there over

some time, and eventually warms up, it can cause the level of damage that we have here because of how much it expands.

MS. ZEMAN: We can close that exhibit.

BY MS. ZEMAN:

Q. Dr. Kasbekar, did that helium sniffer detect any leaks?

A. It did.

Q. Can you tell us more about that?

A. So the helium test showed us that we had signs of helium leaking from the vacuum space into the inner tank. And that leakage was essentially occurring during the lower circumferential weld at the area at the bottom and seemed to be somewhat centered around the fill port weld.

Q. What did you do next during that inspection?

A. The next step, I think, that we took was to use another type of leak test methodology. And it's equivalent to a bubble test using, like, a soap solution, but we use an industrial grade leak-detection solution called Snoop. And Snoop was applied in the area where we had noticed helium was being detected near the bottoms of the tanks and areas that we suspected were leaking.

Q. And that test was done, again, with the participation of all parties; correct?

A. That's correct. All parties. Chart's engineers, PFC, myself.

MS. ZEMAN: If we could look at slides 1 and 2,

please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What does this show us, Dr. Kasbekar? We'll switch to the second one in a moment.

A. So this is one of the technicians or other engineers working for the lab applying the Snoop leak-detection solution to the area around the fill port.

Q. And the next slide?

(Photograph displayed.)

A. The next slide is showing bubbles forming in that area, which was an indicator to us that there was some leakage going on at that particular area.

MS. ZEMAN: Could we please take a look at Exhibit 131-B.

(Video played.)

BY MS. ZEMAN:

Q. What does this describe or show us, Dr. Kasbekar?

A. This is a video that I took with my cell phone. That's the r reason for the shaky hands. What it's showing is the Snoop leak-detection solution picking up a leak in the lower half of the fill port weld.

MS. ZEMAN: Could we see Exhibit 131-C.

(Video played.)

BY MS. ZEMAN:

Q. Dr. Kasbekar, can you describe what this video shows?

A. So once we found evidence of leakage, what I showed in my cell phone camera, the next step is we put a digital microscope on a boom structure and put it into the tank so that we could get close-up on the area where we are seeing the bubbles form. And this is video shot through that digital microscope. It's called a Keyence microscope.

MS. ZEMAN: Could we replay that video, please.

(Video played.)

THE WITNESS: So that's a leak-detention solution being applied. And you can see the bubbles are emanating between about the, you know, four o'clock and six o'clock position on that crack, where six o'clock is the very bottom of the crack and twelve o'clock would be the very top of the weld.

BY MS. ZEMAN:

Q. What does the formation of these bubbles tell you?

A. It tells me that we've got a through-wall crack that goes from the vacuum space to the inner tank space where the nitrogen is stored.

Q. Was this bubble test applied anywhere else on Tank 4 other than at the fill port weld?

A. It was. Before we were all said and done, we had applied Snoop detection solution to virtually, I think, all of the welds on the inside of Tank 4 and perhaps some of the welds on

the outside of Tank 4 also.

Q. Did bubbles form anywhere else?

A. Excuse me?

Q. Did the bubbles form anywhere other than at the fill port weld?

A. The only area we saw bubbles was in the area of the fill port weld.

MS. ZEMAN: We can take down the slide.

BY MS. ZEMAN:

Q. Let me see. What did you do next during your investigation of Tank 4's failure?

A. The next step, I think, that we took was to use an additional detection method to look for leaks or cracks. And we used something called Magnaflux dye-penetrant testing to look for cracks inside of the tank, especially around the weld areas and around the fill port.

Q. Was this the third version of leak testing that was performed on Tank 4?

A. At that point, yes.

Q. How does dye-penetrant testing work?

A. So dye-penetrant testing involves taking -- it's essentially a red dye. And you can either brush it on -- I believe we sprayed it on. So we sprayed it in any of the areas where we suspected there may be leaks.

And then what you do is you wipe it off and you clean it

off very well. And then you spray a developer, which is really a white talcum powder-like substance over there. And anywhere there's a small crack, the red dye tends to seep into that crack due to capillary action.

And when you put the white powder on top of it, that red dye will seep back out and interact with the powder and show us pretty clearly where we might have any small cracks that you simply could not see otherwise.

Q. What did the dye-penetrant testing on Tank 4 show you?

A. It showed us we had a crack at the fill port weld, from about the four o'clock to the seven o'clock position of the weld.

MS. ZEMAN: Could we look at slide 3, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What is this image showing us?

A. So that's after the dye-penetrant testing and after the developer has been generally wiped off. And what you can see is the residual dye in the opening of the crack. And, also, there was an absence of any of that in the weld that is below the crack. So that told us that there really wasn't any evidence of cracking of that circumferential weld. It seemed to be limited to the fill port.

Q. Did you conduct a microscopic inspection of the fill port weld?

A. I did.

MS. ZEMAN: Could we look at Exhibit 126-A.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What does this image show us?

A. So we're looking at, again, the Keyence microscope focused in on the fill port weld. And you're seeing a crack that runs -- once again, this is what I'm saying is about maybe the four o'clock position to about the seven o'clock position.

Q. And the crack runs between those two markers?

A. It does.

MS. ZEMAN: If we could look at Exhibit 126-B, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What does this show?

A. This is a close-up of that same crack. And it's again showing -- it looks almost like a smile. And, again, it tends to end at about that position and that position, and with the widest opening at the six o'clock position.

And I would also note that if you look at it as a smile, there's no overbite or underbite. The upper surface and the bottom surface are approximately in the same plane. One is not coming out of the screen or going back into the screen.

Q. After the three forms of leak testing you've described, were you or any of the other engineers or party representatives

present at the testing able to identify any other leak on Tank 4?

A. We were not.

Q. Were Chart representatives present for all of that testing?

A. Yes, they were.

Q. About how much time was spent looking for leaks over those two days in late 2019?

A. It was the better part -- almost the entire first day and the better part of the second day.

Q. Was the false bottom on Tank 4 present for all of that leak testing?

A. No. After the first day, we removed the false bottom so we could do additional leak testing below the false bottom.

Q. What was the process to remove that false bottom?

A. We had to cut it. So we tilted the tank on its side, and a technician had to gear up and literally had his head in the tank with a grinding wheel and a grinder and had to section the bottom up so we could pull it out piece by piece.

Q. Why was it necessary to cut it up?

A. Because the deformation of the tank above the false bottom was preventing us from getting it out. So we kind of had a hole that had closed down. And the false bottom was still the same size so, we couldn't pull it through that hole in a single piece.

MS. ZEMAN: Could we look at slide 4, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What does this show us, Dr. Kasbekar?

A. So that's the technician who worked quite hard inside of there to make the various cuts that were needed to remove the false bottom, and he's using the grinding wheel. You can see the sparks coming off the grinding wheel. It was a pretty aggressive, intense process to be able to cut that and get it out of there.

Q. Was Tank 4 also digitized during any of the testing that was done with you present?

A. Yes, it was. So after we removed the false bottom, we did additional leak testing. And I think we did additional dye penetrant, perhaps. And then we proceeded to digitize the tank.

Q. And what does that mean, to digitize the tank?

A. So a laser scanner was used to basically take measurements all the way along the surface of the tank. And what it does is it preserves the geometry of the tank. So you're literally waving this laser scanner, and the scanner is reproducing the surface of the tank inside the computer.

Q. Is there a spray used during 3D scanning?

A. There is. When you have an object like this, that's curved and also shiny, the problem with the laser is it hits a

curved surface and will reflect and bounce everywhere.

So the common practice, when doing this, is to spray it with a light coating of talc in order to allow the laser to pick up the surface accurately.

Q. Is that talc powder similar to baby power?

A. It is similar to that. It's almost like a spray chalk.

Q. Did Chart's representatives agree to do that 3D scan using talc spray?

A. They did. They did. And, in fact, they were present during the spraying and the scanning process.

Q. Did you hear any of Chart's representatives express any concern about the talc spray being able to plug a leak that might exist?

MR. DUFFY: Objection. Relevance.

THE COURT: Overruled.

THE WITNESS: I did not.

BY MS. ZEMAN:

Q. Is that something that you think could happen?

A. The leak?

Q. Do you think talc spray could block a leak?

A. I think, given the way that we tested this tank, I think it would be next to impossible because we're pressurizing the vacuum space. And if any particles got caught in something, that pressure should have dislodged that particle to the point that we would have detected helium in that area or seen bubbles

in that area.

Q. Did you use similar powder to detect the crack in the weld with the dye penetrant testing that you described earlier?

A. Yes.

Q. Have you used talc spray and dye penetrant on other failure analysis that you've done?

A. Absolutely. It's a common practice in the industry.

Q. What did you want to do in your analysis of Tank 4 after that second inspection was completed?

A. After the second inspection, I was ready to try to isolate the fractured weld and the adjacent weld of the sense port and to do additional inspection and microscopy, particularly of the fracture surface.

Q. Is that what happened during the third inspection?

A. No.

Q. How does the third inspection start?

A. It started off with additional leak testing.

Q. Why was additional leak testing done?

A. One of the engineers working for Chart had requested to do additional testing with pressurized gas and a flow meter attached to monitor flow rates from the vacuum space.

Q. Was that flow meter test completed?

A. It was.

Q. Did it reveal any leaks?

A. It did not. In fact, we sealed the crack itself with the

flow meter attached. And what that showed us is that -- it was a very sensitive flow meter -- showed us that there was absolutely no flow out of the vacuum space.

So the crack -- once we sealed that one crack, there was no flow. And what that meant to me was that there were -- very unlikely there were any other leak sites.

Q. Did you do anything else to test for leaks during that inspection?

A. Ultimately, we also filled the lower part of the inner vessel with water up to a certain level, to go completely above the welds, to see if we could see any bubbling of gas coming through the water. So essentially looking for bubbles in water.

Q. Did that reveal any leaks?

A. It showed us that there were no leaks in the bottom of the tank, at all, other than the one that we had sealed.

Q. After that, did you begin disassembling the tank with all of the parties present?

A. We did.

Q. We don't need a play-by-play, but can you walk the jury generally through the process of disassembling the tank?

A. Absolutely, yes.

THE COURT: Is now a good time for a break?

MS. ZEMAN: I think it's probably a good spot.

THE COURT: Okay. Members of the jury, we will take

our second and last break of the day. Another 10-, 15-minute break. As always, please do not discuss the case with anyone.

(Recess taken at 12:02 p.m.)

(Proceedings resumed at 12:12 p.m.)

(Proceedings held outside the presence of the jury:)

THE COURT: Docket number 806, page 2, I ruled on Exhibit 208 expressly.

MR. LOTHSON: True. But you said let's see. And then you said it goes to notice. And I would point out that notice is not an element of any claim that Kasbekar is up there to testify about. Notice is not an the element of strict liability.

The incident involved is about --

THE COURT: Let me hear from Ms. Zeman what the expert is going to use the exhibit for.

MS. ZEMAN: He will testify that he relied on that document, that it is an example of this exact failure mode happening and Chart being aware and Chart itself actually suggesting it as a failure mode, which is sort of inherently being notice of it being a workable failure mode as Chart itself is the one that described it.

MR. LOTHSON: Your Honor, if I may, it's a different model tank. An MVE 1839 freezer --

THE COURT: Okay. That's an issue for cross-examination.

MR. LOTHSON: It was hit with a forklift.

THE COURT: Okay. That's an issue for cross-examination.

MR. LOTHSON: But --

THE COURT: All right. Objection overruled again. 208 is in evidence.

MR. LOTHSON: Well, Your Honor, just for clarification, is it a substantially similar other occurrence. Is that the finding? Because that's the admissibility to put it in --

THE COURT: I'm going to see how the testimony comes in. It's statements of a party opponent, so it's not hearsay or things like that.

So objection overruled, again, from for the second time. I dealt with it before when you -- well, three times now. We had the other occurrences motion *in limine*, and you chose not to attach that or argue that particular exhibit.

Then we had it again, raised again, and I ruled on it. So I don't actually know what's different here now, and I'm overruling the objection for the third time.

MS. ZEMAN: Thank you, Your Honor.

MR. LOTHSON: Your Honor --

THE COURT: No more.

MR. LOTHSON: I'm not giving you any more. I'm understanding your ruling, that's all.

THE COURT: Okay. All right. Is your rest of your team around?

MR. LOTHSON: I'll go tell them.

THE CLERK: I'm going to go this way and grab the jury and come out this way.

(Jury enters at 12:15 p.m.)

THE COURT: Thank you, members of the jury.

You may resume Ms. Zeman.

MS. ZEMAN: Thank you, Your Honor.

If we can see slide 5, please.

THE COURT: Thank you, members of the jury.

You may resume, Ms. Zeman.

MS. ZEMAN: Thank you, Your Honor.

If we could see slide 5, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. Dr. Kasbekar, I think where we had left off, I was just about to ask you to kind of take us through, generally, the steps of disassembling the tank.

We have a couple of slides here. We can cycle through those as you describe for us.

A. Okay. So the first thing we did is we marked an area of interest where the fill line tubes and sense tubes were located. You see the word "grind." We want to be particularly careful about cutting through that part so that we didn't

interact with those tubes.

So the first thing we did is we cut a partial cut in the area where those tubes will go down, which is between here and somewhere in here. And we just made a very precise cut in that area.

Prior to that, we had drilled with a hole saw, a hole right here, and that was done to use something called a power nibbler that we use to cut around the top edge, kind of like an industrial can opener.

Q. So it's essentially cutting the outer vessel away -- the process of cutting the outer vessel away from the inner vessel?

A. Exactly. We made a cut that was right along the top edge. And then we literally lifted the inner vessel from the outer vessel. The outer vessel is much heavier and more robust than the inner vessel.

MS. ZEMAN: If we could see the next slide.

(Photograph displayed.)

BY MS. ZEMAN

Q. Is that what we're seeing here, lifting that inner vessel out?

A. Yeah. After we completed the cut, the inner vessel was attached to a hoist and we lifted it out. And you're seeing the multilayered insulation wrap that encapsulates the inner vessel.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is a picture just showing the bottom where you can see, again, I think there's about 60 wraps of insulation, foil, and a paper-type insulation that encapsulates the inner vessel for further insulation.

MS. ZEMAN: Next slide, please.

(Photograph displayed.)

THE WITNESS: That's after we cut away the insulation wrap. And what you're seeing now is the buckled inner vessel. And you're seeing the fill and sense tubes that run from the top. So here and here. And the ports are down at the bottom.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: Again, this is showing the buckled inner vessel. This is the fill port that we've been talking about, or the fill line going to the fill port. And you can see the extensive implosion of the inner vessel.

MS. ZEMAN: Next slide, please.

(Photograph displayed.)

THE WITNESS: This is a sieve pan that we talked about earlier, that's located at the bottom of the -- attached to the very bottom of the inner vessel. And it's attached with spot welds that are just tap welds in a few places that hold that pan to the bottom of the inner vessel.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is the sieve material, the molecular sieve. The getter. Looks, like I said, kind of like a kitty-litter-type appearance to it.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is the -- again, the tank where we've marked the fill and sense lines. And we're getting ready to cut those lines free to separate them from the tank so we have better access to the area of interest, which is the welds at the fill and sense port.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: So this is where we've marked where we're going to make our cut after we've cut those lines. The next cut was to take out this big section here so that we could gain access to the fill port weld.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is a cutting process, again, with the grinder. And you notice the individual holding the weld ports with gloves because of the heat that the grinder generates.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: We're looking now at the inner tank after we've cut out that section to isolate the fill and sense ports.

BY MS. ZEMAN:

Q. When you say "we," who are you referring to?

A. "We" is all of the parties. Chart, the clinic, myself, their engineers, and their attorneys were all present during this process.

Q. About how many people were present during that inspection in March of 2020?

A. More than ten.

Q. Was it a fairly large group?

A. It was a fairly large group.

MS. ZEMAN: Next slide, please.

(Photograph displayed.)

THE WITNESS: This is a section that was removed so that we could more closely evaluate the area of interest at the ports.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: Again, prior to doing any cutting, we had a written protocol for most of the inspection, and part of the protocol was that we would mark areas. And that's a normal way of going about it so that everybody knows where the cuts are going to be made prior to cutting.

So we've marked this as to how we're going to section it up in pieces so that there's no misunderstandings.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is the Leco cutoff saw that was used to make the cuts through the stainless steel section to the inner tank.

MS. ZEMAN: The next slide.

(Photograph displayed.)

THE WITNESS: Again, after every step we would photograph it to preserve what we had done. Everybody had an opportunity to photograph. So this is showing those cuts that we marked after they were made.

BY MS. ZEMAN:

Q. About how many photos did you take during your analysis of Tank 4?

A. Several hundred. I don't know the exact number. I mean, it may be close to a thousand photos.

MS. ZEMAN: All righty. The next image.

(Photograph displayed.)

THE WITNESS: This is where we've isolated the fill port weld. And you can see the crack in this area right here. And what's been done here is a saw cut was intentionally made on both sides leading up to the weld and up to the crack but not into the crack.

And this is a typical procedure we use because we want to separate that crack so that we can look at the actual fracture surface instead of just down into the crack. But we don't want to cut into it with the saw, which would damage a fracture surface, so we make these cuts.

And they're basically notches leading up to the crack. And then we put it in a tensile test machine, and that will pull them apart. And we'll be able to tell which part of the crack had existed before we pulled it apart and which part is due to the pulling apart process.

BY MS. ZEMAN:

Q. Why were you wanting to pull the crack apart?

A. It was very important to me to be able to look at the fracture surface because that's one of the key elements of failure analysis is to look at the broken part, look at the fracture, because it often contains key physical evidence that tells us where the fracture started and how the fracture took place.

Does it take place due to one single event, being pulled apart, or an explosion or an impact, or was it something where it was a cyclic load, from the load going up and down, up and down. It leaves different telltale features on the fracture surface that we would look for.

MS. ZEMAN: Next slide please.

(Photograph displayed.)

THE WITNESS: So this is showing the separated fracture surfaces after we pulled them apart. We actually drilled two holes at the top, in part of the metal, in order to grip it better in the tensile test machine.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: This is the back side of that same part.

Can we go to the previous slide for just one second?

(Photograph displayed.)

THE WITNESS: So this is what we call the lower fracture surface. I'm sorry. This is actually upside-down. No, it's not.

Lower fracture surface, upper fracture surface, because that's the way they were warranted in the tank.

BY MS. ZEMAN:

Q. Back to the next slide?

A. Please. Yeah.

And that's just the backside. So the weld is on the front side, which is inside the tank where the liquid nitrogen and the eggs and embryos are stored.

Now we're looking at the backside from the vacuum space. And what you're seeing here is the backside of the weld where it's come through into that metal.

And this is a fill port. And then this hole is where we cut the tubing that would normally go up and be plumbed into a

supply tank of liquid nitrogen.

MS. ZEMAN: Next slide.

(Photograph displayed.)

THE WITNESS: Again, this is a close-up where we're looking at the upper fracture surface. And this kind of textured gray area -- I'll try to highlight it with my finger, that area. That's the actual fracture surface. That's what I'm, at that point, most interested in looking at.

This shiny material here, that's the thin wall of the inner vessel. And so you can see it basically leads up, and then this is the weld area right in here and right in here.

And we'll see this more clearly in other photos, but what you'll see is that this weld is not even the thickness of this metal.

It'd be better to use arrows.

BY MS. ZEMAN:

Q. Should the weld have been as thick as that bright metal?

A. In my opinion, it should be. Generally, when you join two parts, you don't want your weld to be the weak link. You want it to join those parts.

And, normally, there's actually a reinforcing section of the weld. So the weld, from a structural standpoint, a strength standpoint, should never be thinner than the thinnest of the two parts that you're joining.

Q. And for this fill port, is the inner vessel wall the

thinnest metal of the two parts being joined?

A. Yes, it is.

Q. And that's the bright metal that we see in the photo?

A. Yeah. It's this area right here and this area right here.

Q. I think we have one more photo in this segment.

(Photograph displayed.)

THE WITNESS: So this is the lower half of the smile of the lower fracture surface. And, again, you can kind of see a textured silvery area in there. That's the fracture surface that we would want to look at under the microscope to look for any sort of characteristics or features that would tell us more about how this fracture took place; what caused it to happen, where did it start, and which direction did it run.

BY MS. ZEMAN

Q. Dr. Kasbekar, was the fill port weld in these fracture surfaces, were they put under a CT scan?

A. They were. In fact, prior to us separating the parts or even making the saw cuts, these welds were put into a industrial CT scanner, which, just like a medical CT scanner, but maybe with even a little bit more resolution, allows us to collect a set of x-rays and be able to look at the part internally.

MS. ZEMAN: Could we look at slide 25, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What does this image show us?

A. So this is an image from the CT scan. And I'd start in the upper right-hand corner in order to explain it. But what we're looking at, you can kind of see this is from the CT scan, but we're looking at the back side of that port.

And that thin red line that you can see right -- ah, missed it. But kind of right there at the left edge of that green, that thin red line is where we told the CT scanner to section through the data and let us look at it.

So it's almost like we cut through the part in that place. We haven't cut it, but we're using the computer to cut it. And then this is what it shows us, this area right here (indicating) through that plane that we've cut.

It's a little complicated to look at, but I think once you understand it, it will be much more simple. What you're looking at is the fill port itself, that elbow fitting we talked about.

This is the lower wall and the upper wall of the interior tank. So that's that sheet metal we talked about earlier.

And then this is the fill tube that goes up and out of the tank and is eventually connected to a supply tank.

So the liquid nitrogen comes down here, goes through this port, and into the -- into the tank.

So what's important about this is what I saw leading up to

the weld, which is almost this -- so we're in the -- the vacuum space is on the left side of that line, and on the right is the nitrogen space.

But leading up to the weld, you kind of see that channel of black that's like a notch. That creates a stress concentrator. And the best way to explain that is, when you have a sharp feature like that, from an engineering standpoint it's undesirable. It can cause crack initiation, especially when you have a part that's being repetitively loaded.

So the first thing I noticed, we have a very sharp feature leading up to the weld. And that's bad. Then at the bottom, this is where the crack actually went through, where we saw the bubbles come through.

We've got this red box. And we've enlarged that red box area here. And what this is showing me is that we've got a crack that runs from the nitrogen space into the vacuum space. And that, in my opinion, creates a path for nitrogen to seep into the vacuum space.

And, again, we've got this unwelded, unfused area that creates a sharp notch right at what's called the root of the weld. It's an important concept.

This is the face of the weld in the liquid nitrogen space. And this is the root of the weld that's in the vacuum space. And later on I'm going to explain how I could tell that the crack started here and ran that direction, from the vacuum

space, the root of the weld, toward the nitrogen space.

Q. Dr. Kasbekar, let me try to back up a little bit. That was a lot of information.

A couple of different things you mentioned. I think you mentioned that there's a stress raiser or stress concentrator visible in this CT scan. Is that right?

A. Yes.

Q. And what was your explanation of what a stress raiser is?

A. So a stress raiser is a sharp feature. And an example would be in a candy bar. I think probably the ultimate example would be a Kit Kat Bar. It has those notches so that when you apply a load to it, it breaks right along that notch. In a Kit~Kat Bar, in that case, it's a designed-in feature to allow it to break.

In a structure like this, you don't want that feature. The classic example that I use when I teach a failures class is the British, a long time ago, made a plane called the Comet. And the window openings were all square, and those corners are sharp. Well, they flew fine for a while, but then all of a sudden cracks started at all those corners and ran to the point where the outside skin of the airplane would just fall apart.

So stress concentrators are -- unless they're designed like in the Kit~Kat Bar, they're not desirable features. They immediately draw engineers' attention to a potential problem area.

Q. Is the end of that Concord story why windows in airplanes are curved?
A. Yes. Comet. Not the Concord; the Comet.
Q. Sorry.
Does this CT scan also tell you anything about the fit-up of the fitting to the inner vessel?
A. It does. It's hard to see just from the CT scan, but the issue with the fit-up is the inner vessel is round. It's got a curved surface. And the face of the port fitting that we're trying to fit up -- Chart is trying to fit up there is flat. So you end up with a gap between the flat surface and the curved surface. And that's not a good fit-up for making a weld.
Q. Would it be better if the fitting were curved, as well, to match up to the inner vessel curve?
A. It would be a much better fit-up.
Q. Does this weld at the fill port on Tank 4 have a full-penetration weld?
A. It does not.
Q. What is a full-penetration weld?
A. So a full-penetration weld -- when you weld something, you have a joint. You have a space between two parts. That's your joint. A full-penetration weld completely penetrates and fuses both surfaces for the entire length of the joint.
So probably the best way to explain this -- I don't know

if I can -- you can see my hands. If the joint I'm trying to weld are the palms of my hands, a full-penetration weld, if we use glue as the weld, it would be as if I put glue on both palms of my hands and glued them together. That's a full-penetration weld. It's a strong weld.

Partial-penetration weld would be the equivalent of maybe I just put glue on my index fingers and then only glued that part of the joint together. And the partial-penetration is a much easier weld to have fail or break apart because if only my index fingers are glued and I have a force that wants to open up this joint from this direction, it's going to tear that welded part of the joint right apart.

Q. Should the weld on Tank 4 have been a full-penetration weld?

A. Yes, it should have, in my opinion, but also based upon the specifications in the drawing that was supplied for this particular tank and that particular weld.

Q. Did you review the design specification for Tank 4?

A. I did.

Q. And did it call for a full-penetration weld?

A. It did.

MS. ZEMAN: Could we see -- let me try that again. Could we see slide 26.

(Document displayed.)

BY MS. ZEMAN

Q. Dr. Kasbekar, what is this?

A. It's a drawing for Tank 4 or for the MVE 808 tanks.

MS. ZEMAN: And if we could move to slide 27.

(Document displayed.)

BY MS. ZEMAN:

Q. This is zoomed in on the upper left corner of that same image. Can you explain what we're seeing here?

A. The upper right corner.

Q. I'm sorry, the upper right corner. Thank you.

A. So what we're looking at, this drawing is turned on the side so it's as if the tank has been turned and laid flat on its side. So this would be the lower corner right here.

And what we're looking at is -- this is the fill port that we've been talking about, or the sense port. Vacuum space in here. Nitrogen space in here. And this is the specification for the weld, or the weld call-out.

Q. Is that the weld that goes around the fill port on the inside of the inner vessel?

A. It is. And what that symbol tells the welder, and the reason the engineer put it there, was to spec out the type of weld. And what it tells them is that this is a butt joint where the two pieces come together, like my hand.

And there's supposed to be a weld that has a convex space. That's why it's got that shape at the bottom. So the two

vertical lines, with that symbol, show butt joint, and the curve shows how the face of the weld should be finished. And then the fact that it's on the lower side of the line tells us that it should be done on the inside of the tank.

And then it says "typical" here. And it's typical because there's two welds there, and there's no other information. In contrast to, say, where the sieve port -- this is a weld for the sieve pan, where it attaches. And the information here says to tack it in four places.

So that tells the welder it doesn't need to be a complete weld; it can just be tapped. The absence of information like that over here is -- tells a welder it needs to be a full-penetration weld.

If it was supposed to be a partial-penetration weld, there would be a fraction there, like one-half. Typically, I believe it's put in parentheses. And that tells the welder that you only have to weld through half the thickness of the gap or the joint in the two parts.

And when that is not there, it tells the welder you have to weld the full-penetration of the joint.

Q. So, Dr. Kasbekar, to me, all of these symbols you just described look a little bit like hieroglyphics. But are you telling us that to engineers and individuals who work with these drawings those have a specific meaning?

A. Yes. I mean, what it tells me is the person who designed

the tank called for a butt joint, full-penetration weld with a convex finish on the face of the weld.

Q. And is this the assembly drawing that would be used by a team manufacturing Tank 4 or other tanks of that same model?

A. That's my understanding. And it's the only information we have from Chart related to this -- what was called for for this weld. At least only printed document that we have.

Q. Why would it be necessary to put a full-penetration weld in this location?

A. Excuse me one second.

Well, in my opinion, it's necessary, number one, because that's the way it was drawn. And when things are not built that way, that's what we call a manufacturing defect.

And then, number two, in my opinion, that port is subjected to significant stresses called thermal stresses. And that happens when this long length of 26-inch tubing goes from being at room temperature, the way it's manufactured, down to liquid nitrogen temperature. It's going to want to get shorter. It's a known engineering principle.

When it wants to get shorter, it's going to pull that fitting in this direction. And that weld's got to resist all of that force, so it's important that that weld have good strength, good structural qualities.

Q. Is the basic concept that you just described that metal contracts when it gets cold?

A. That's correct. Metal contracts when it gets cold and it expands when it gets warm.

Q. And did you say that the fill line then would contract when liquid nitrogen runs through it?

A. It absolutely will.

Q. Would the fill port weld essentially act as a hinge as that fill port -- as that fill tube contracts?

A. What's going to happen is that when this length of tubing tries to get shorter, it's essentially going to -- because the top of the tank is so thick, it's going to pull that port in this direction, toward the top of the tank. And it's going to make that port want to twist and rotate -- that's supposed to be an arrow at the end of that -- rotate in that direction.

And what that does is it puts a lot of tension at the bottom of that weld, right at the six o'clock position at the root of the weld where the stress concentrator is.

Q. Did you do anything to analyze the thermal stress on Tank 4?

A. I did.

Q. What did you do?

A. We modeled the tank in the computer, and the fitting, and the 26-inch section of line. And what's important to understand about that 26-inch section of line is, when this tank is made in Georgia, it is welded. And when you weld something like this, that tubing is going to get hot. I mean,

too hot to touch. Welders wear gloves to handle the parts.

And then once that second weld solidifies, you've locked that 26-inch long section of tubing between that top weld and the bottom weld. It's fixed in there by the weld even though the tubing is still warm. So that's kind of an equilibrium point right there.

Then the surface conditions for a cryogenic tank are temperatures equivalent to the cryogenic fluid, the liquid nitrogen, which is minus 196C. So when that nitrogen flows through that fill tube and goes down into the tank, it's taking that tube that was fixed at higher temperatures than room temperatures and it's cooling that entire tube to liquid nitrogen temperature. So that's over a 200-degree C temperature drop. It's pretty significant.

And that tube is going to contract, and when it contracts it's going to pull up on that weld. And engineers know about thermal stresses.

I mean, an example would be when you drive across a bridge, like the Golden Gate Bridge, you're going to have expansion joints in there. Those expansion joints are in there so that the bridge won't fail.

Temperatures go from maybe, I don't know, San Francisco, 90 degrees down to pretty cold temperatures. Well, that bridge needs to be able to grow and contract. And if it was all one piece, it would buckle and fail.

MS. ZEMAN: Could we see slide 28, please.

(Document displayed.)

BY MS. ZEMAN:

Q. What is this image, Dr. Kasbekar?

A. So slide 28 is the computer model I started talking about before I got off on a tangent. And it's a finite element model.

And what it is, is the computer models the geometry, and then we can tell the computer how we want to load it. If we want to hang a weight from it, we want to blow wind at it, we want to shake it.

In this case what we told the computer is to take that 26-inch section of line and to cool it down from room temperature. Not from above room temperature but from room temperature.

And then we asked the computer, well, what type of stresses are we going to see? What type of forces are going to be in the material? So it's showing us the forces for everything you see on the screen.

Blue is a low force. And, in fact, dark blue is a compressor force. So we have forces that tend to push things together, that's compressive, and forces that tend to pull things apart.

And what this is telling me is when you cool that 26-inch section of line, the forces at the root of the weld between

that kind of four o'clock and seven o'clock position are really between about three o'clock and nine o'clock, that lower half of the smile, there's a high-tensile force there.

This particular image shows about 29,000-psi of force, which is pretty close to the yield strength of the stainless steel. So -- and what that is, a yield strength is the point at which the steel starts to deform and it won't recover. So steel you can pull on a little bit and it'll spring right back to its original state. You pull it too much and it won't recover.

Engineers do not like to see stresses that are near the yield point of a material. That's no factor of safety there. Once you get near the yield point, little defects like cracks, stress concentrators, imperfection in a weld that's not a complete penetration weld and is irregular, those all create problems.

So this is telling me we've got some significant stress in the weld when you cool that tube down.

Q. And, Dr. Kasbekar, did that FEA analysis show that particular stress where right where the crack opened up on the fill point for Tank 4?

A. Correct. It's right at the six o'clock position, right at the lower part of the smile, right where I believe the crack initiated.

Q. And did that analysis indicate that the fill port weld was

subjected to enough stress to crack it?

A. It absolutely shows me that the stresses are at a level. And when you combine that with the stress concentrators, there's no question that that potential exists.

And what's important to understand, when you have a stress concentrator, especially if you have a crack, that magnifies the stress by a factor of two, three, four, depending on how sharp it is. So that's a significant thing.

So if you take that 29,000 and you magnify it by 2, you're well above the yield strength.

MS. ZEMAN: Could we see slide 30, please.

(Document displayed.)

THE WITNESS: So this is a cross-section through the finite element model --

BY MS. ZEMAN:

Q. I think we actually skipped ahead to the CT scan here.

A. Oh, okay.

Q. Do you want us to go back to the prior one?

A. Since we put it up, let's go back for a second.

MS. ZEMAN: If we could go back to the prior slide.

THE WITNESS: This is where we're looking inside the weld. So it's kind of upside-down. This is the fill port area and the weld -- I'm sorry -- this is sheet metal and this is a weld.

And that orange area is showing us we're getting pretty

high tension inside of the weld area because of that stress concentrator that's geometric. Not specifically because of a crack but just because of the way the parts were fit up.

And that's a tension that is right up there, in fact, a little bit above the yield point in the material.

MS. ZEMAN: All right. If we could go to slide 30.

(Photograph displayed.)

BY MS. ZEMAN:

Q. Dr. Kasbekar, what is this image showing us?

A. This image is showing us three separate parts and CT scans of those parts. So A, on the left, is the subject tank.

Q. Tank 4?

A. Yeah. And the fill port weld where it failed.

And then B is a new exemplar tank which I procured from Chart and removed the weld just the way we did in the subject tank. But this tank was never, ever put into service. It was brand-new as delivered from Chart.

And then the one on the right is a test weld that I had done after machining an exemplar port and getting the stainless steel tubing.

And what this shows is the difference in weld penetration. So in the red circles, that's where you have poor weld penetration. And you can see it in the subject. It's even better to see -- I don't know, can we zoom in on this part of the image?

Q. I don't think we can.
A. Okay. No problem.
So if you look at that, you'll see that black space between the fitting and between the sheet metal in the weld. And that arrow not in the right place.
Do that again.
Between the fitting --
BY MS. ZEMAN:
Q. Sort of a dark pizza pie --
A. Yes.
Q. -- between those two?
A. Yeah, a dark channel that leads up right to the root of the weld. And that channel is what forms a stress concentrator. It shows that we're not getting complete penetration. And it's showing that we have a bad fit-up; we have this gap between the two parts that we're trying to weld.
Now, the exemplar tank that I bought had better places. Part of the weld was still showing this issue down here, but up here this is a much better portion of the weld. We've got fusion completely through the weld. There's no gap there. There's no stress concentrator.
And then in the welds that I had a welder perform for me, same situation. We have no gap, a good fit-up, because we've adequately penetrated that joint.
Q. That middle image, is that the same tank model as Tank 4?

A. Yeah, it should be exactly the same tank model as Tank 4.
Q. And is the area in the red circle a poor weld, essentially?
A. It is, in my opinion.
Q. And is that in essentially the exact same area as failed on Tank 4?
A. Yes, it is.

MS. ZEMAN: Could we see slide 31.

(Photograph displayed.)

BY MS. ZEMAN:
Q. What are we seeing here, Dr. Kasbekar?
A. So slide 31 is the upper half of the fracture surface that's attached to the fill port fitting.

And this is taken under the Keyence microscope. And what we're seeing is the kind of textured area right here, that silvery area, that's a fracture surface. That's really what I'm interested in ultimately looking at at higher magnification under a microscope.
Q. Is that the upper fracture surface?
A. It is. It's the upper half of the smile, so it's the upper fracture surface.

Then these yellow arrows are the part of the fitting where I would have expected a full-penetration weld to attach the inner tank wall to that fitting. But what you can see in this area where the yellow arrows I've drawn -- this is a little bit

too far to the right. Let me try one more time. I apologize.

That area, there's no weld material. And at least a portion of that area should have weld material if you had good penetration in the weld.

And then we've kind of zoomed in on what's out of the picture here, but in this area right here. And what you're seeing, again, is the absence of weld material in this area right here.

And this shiny part is a saw cut through the sheet metal right there. And that's the thickness of the sheet metal. Well, you can compare the thickness of that sheet metal with the thickness of the weld area, and you see that the weld is substantially less thick than the sheet metal that it's supposed to join to that fitting.

Q. Dr. Kasbekar, according to Chart's design specifications, should there be weld material where the yellow arrows are on this image?

A. There should be weld material where the yellow arrows are at least to the depth of the thickness of the sheet metal for full-penetration weld.

Q. And do you say that just because, in your engineering opinion, you think that or because Chart's design documents actually require it?

A. No, that's what the drawing requires.

MS. ZEMAN: Could we --

BY MS. ZEMAN

Q. Did you have anything to tell us about the last image at the far right?

A. Well, what the last image is doing is, again, just comparing this arrow down here. It's showing the thickness of the sheet metal. And then this arrow up here is showing the thickness of the weld.

The weld varies in thickness. There's a very thin section of weld here. That section is, in fact, paper thin. But I do think it's important and fair to point out that some of that thinness could have occurred either during the final parts of fracture or in the laboratory when we separated it.

So the weld is definitely too thin. It's thinner in some spots than in other spots.

BY MS. ZEMAN:

Q. But at all points it's too thin; correct?

A. Based on the drawing and based upon my opinion that there should be a full-penetration weld to accommodate and deal with the thermal stresses, it is too thin. It's not built the way the drawing says it should have been manufactured.

MS. ZEMAN: Could we see slide 33, please.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What is this image?

A. This is an image from the scanning electron microscope.

And what that is, is it's a microscope that lets us go up to pretty high magnifications and still keep the entire part in focus. So it has something called good depth of field. So, like a camera, I could focus on the person close to me and also get the person sitting a little farther away both in focus.

The electron microscope does a good job of that. And it's one of the most critical tools of the trade for metallurgists and failure analysts.

Q. Do you use this to analyze the fractography of the crack?

A. I do. And what we're looking at is the lower half of the smile, or the lower section of the fracture. And I actually put together this is a series of one, two, three, four images from the electron microscope that I have composited together to see the entire fracture surface.

And this shows us where the saw cut was made and the thickness of the sheet metal. Same here. Other saw cut. And then the rough area -- so let me say this first.

This is the inside of the tank where the liquid nitrogen and the samples are. This is the vacuum space side of the tank. And this is going to be a little hard for me to draw, but I'll try, this wavy irregular shape, that's the root of the weld.

This weld is made by hand. It's not -- some welds are made by machine, like most of the welds on your car are made by robots. This is done by hand.

Q. And is the area that was sort of between the wavy line and the lower green line, is that the fitting?
A. Yes. So this is the surface of the fitting right here.
Q. Got it.
MS. ZEMAN: Could we see the next slide, please.
(Photograph displayed.)
BY MS. ZEMAN:
Q. Dr. Kasbekar, could you tell us a little bit about what the fractography analysis showed and what this image reveals?
A. Yes. So, for this particular slide, number one, we'll point out we're looking at a magnification of 500X in the microscope. And the bottom of the image, again, that's the root of the weld in the vacuum space. And the top of the image is really the face of the weld.
And what we're looking at is some damage where the two halves of the fracture surface, like -- if you look at it as the top fracture surface is the biting surface of your upper teeth and the bottom is the biting surface of your lower, they come together.
And these areas, I'll try to highlight them where you can see that this material has been mashed down.
Q. And what does mashing down suggest to you?
A. That tells me that we probably got a cyclic process here of where a crack opened up because the stresses were high and then the stresses relaxed, perhaps when the liquid nitrogen

came out of part of the tube and it closed back down on itself.

So these rub marks or contact marks are pretty classic signs indicating a fracture from cyclic loading. And that's a load where the load goes up and then it comes back down. That's very different than a fracture where the load just continually goes up.

I mean, even if the load goes up and stops and then starts again, you're not going to have this contact damage because it's got to release the loads. So that's what we're seeing here.

And then this is a little harder to see unless you've looked at this a lot, but down at the bottom this is really featureless fracture surface. It doesn't have fresh fracture surface on it. That's near the root of the weld.

Well, if you have a crack -- if my fingertips are the root of the weld and it opens up there, that area, when it closes, is going to get the most repeated loading. And if something happens to cause the crack to open up in the other direction, it's going to mash those surfaces at the crack origin down. And that's what that image is showing me, is that we've got mashed-down surface here, contact mashed-down surfaces in these areas also.

Q. Is that essentially saying that the oldest part of the crack is going to be the smoothest part?

A. It'll be -- yeah, smoothest or the least features on it.

Yeah. And the most mashed-down material.

MS. ZEMAN: If we could go to the next slide, please.

(Photograph displayed.)

THE WITNESS: All right. This is a particularly important image from the electron microscope because, when you look at this image, what's immediately apparent to me is you'll see kind of these lines almost like wave patterns of different zones.

And what those are called are beach marks, or sometimes called clamshell marks, crack arrest marks. And what that tells me is there were multiple cycles in that after a certain number of cycles with a certain load, the crack either stopped or the load changed, kind of equivalent to maybe one day the tank gets filled up 2 inches, the next day 4 inches, the other day a half-inch. All variations in the load, and they're going to leave different types of marks.

This isn't every single step of the crack. These are just zones that have existed for some period of time when the crack moved.

And what's important about this, not only does it, number one, tell me that it's due to repeated up and down cyclic loading consistent with that fill line expanding and contracting, but the shape and the curvature of it tells me where the crack initiated because the curvature points to the origin almost like a dartboard points to the center.

So this is telling me the crack originated on this side of the fracture at the root of the weld where the stress concentrator is. And that's an important finding. And it tells me that the cracks ran in that direction from the vacuum space toward the liquid nitrogen space.

BY MS. ZEMAN:

Q. So those markings tell you that the crack started in the vacuum space and worked its way into the liquid nitrogen space?

A. That's correct.

And, also, we can see -- again, I'll try to outline it, but somewhat below these areas you can see the texture of the fracture surface is different than when you get into this area.

And the reason for that is this is where the crack is starting, so these are the most worn-out areas from the cracked surfaces contacting themselves.

MS. ZEMAN: Could we see the next slide, please.

(Photograph displayed.)

MS. ZEMAN: And the next one.

(Photograph displayed.)

THE WITNESS: Okay. This is also another important feature. It's secondary to the beach marks we talked about, but when you have a fatigue crack that progresses due to cyclic loading, often what you'll see is secondary cracks or micro cracks.

And what's important to understand is this -- again, this

image at the bottom is a vacuum space. The top is a liquid nitrogen space. And, in my opinion, the crack ran from the bottom, where it originated down here, and it ran toward the top.

Well, all the literature that I've ever read, all the training I've got, when you're looking at a fatigue crack, you tend to have micro cracks that run perpendicular to the direction to the crack. So if the crack is running up, those micro cracks run perpendicular in that direction.

So if you look in these red boxes -- again, I don't know if we can zoom on this --

BY MS. ZEMAN:

Q. I don't think we can.

A. Okay. If you look at the center red box, you'll see these little gaps that are dark areas.

There we go. That would be great if we could do that.

MS. ZEMAN: Were you able to zoom in?

I think that's the --

THE WITNESS: Oh, that's great. Thank you.

So inside of those boxes --

(Laughter)

BY MS. ZEMAN:

Q. Oh, well. Let's carry on.

A. Okay. Inside of those boxes, you see these gaps. Those are the cracks, and they're running from left to right. So the

crack direction is this way. The primary crack direction.

And the micro cracks are running this way, perpendicular to the crack direction. That's another sign that we look for. And we're taught in our fractography and our fracture mechanic classes to look for as a sign of a fracture that occurred due to repeated loads, cyclic loads that go up and down.

Q. Are those features that you taught your students at Duke to look for when doing failure analysis?

A. Yes.

MS. ZEMAN: We can close out the slides.

BY MS. ZEMAN:

Q. After all the testing and examination you did of Tank 4, Dr. Kasbekar, were you able to come to a conclusion about what caused Tank 4 to fail?

A. I was.

Q. What is that conclusion?

A. A progressive crack due to cyclic loading that occurred at the root of the weld at the -- starting at the six o'clock position, running from the inside of the vacuum space, between the inner and outer tank, toward the inside of the tank toward the liquid nitrogen space.

Q. Would Tank 4 perhaps have behaved differently had it had a full-penetration weld at that spot?

A. It certainly would have been significantly stronger because there would have been more material. It's a very basic

principle. A 2-by-4 is not going to be as strong as a 6-by-6, so you would add more material.

You also would have -- a full-penetration weld would eliminate the geometrical stress concentrator that comes up to the root of the weld.

Q. Would Tank 4 perhaps have behaved differently had it had a better fit-up between the fitting and the inner vessel wall?

A. Yes. Again, that would have reduced or eliminated the stress concentrator, the notch that leads up to the root of the weld.

Q. Would it perhaps have behaved differently had the fitting not been designed to have stress raisers in it?

A. Yes. I mean, if the fitting -- if you could eliminate the stress risers, you would substantially not only improve the strength, but you would make it much less susceptible to cyclic loading because fatigue cracks tend to initiate at stress raisers. They're very, very sensitive to that.

Q. Dr. Kasbekar, how do you think-- strike that.

MS. ZEMAN: Could we please look at Exhibit 192.

MR. DUFFY: Objection, Your Honor. Just to perfect the record on the knowledge component we've been arguing as to this document, Your Honor.

THE COURT: All right. Noted.

Go ahead.

BY MS. ZEMAN:

Q. Dr. Kasbekar, do you recognize this document?

A. I do.

Q. What is this?

A. It's a -- what's called a DFMECA, or design failure modes -- DFMECA, D-F-M-E-C-A, which stands for Design Failure Modes and Effects Criticality Analysis.

Q. Does that mean something to engineers?

A. It does, yes.

Q. What does it mean?

A. It's where a team of engineers, who are familiar with a product, whether it's an automobile, a bicycle, refrigerator, use their combined knowledge to look for failure modes that could occur in that product and determine what could cause the failure, how likely is it to occur, and how severe are the consequences if the failure does occur.

And then to identify ways to either redesign the product to make it fail-safe or find a way other than that, if you can't design out the problem, to mitigate it by a secondary measure, doing something to prevent the consequences or to reduce the severity of the consequences.

Q. Is this failure analysis done by Chart of its own products?

A. Yes, that's exactly what we're looking at here.

Q. Have you worked with failure analysis documentation like

this before?

A. I have.

Q. And in what context?

A. Well, part of the process of teaching students in the failure analysis and prevention classes, as well as in design classes, is to have them -- one of the exercises is to try to define or design a reasonably safe product.

And you have to go through the steps of identifying how that product could fail, be abused, be misused, and what can you control as an engineer in the design to prevent those failures.

I also see it frequently in analyzing other failures where the manufacturer's team has gone through a similar process. The general process is failure modes and effects criticality or failure modes and effects analysis. It applies to the manufacturing steps as well as the design steps.

Q. Does this failure analysis apply to Tank 4?

A. It does.

Q. What did you learn from reviewing this document?

A. Uhm, I learned that there's only two entries in this entire document, which actually has multiple, multiple pages to it, that relate to implosion of the inner tank similar to what we see on the subject Tank 4.

Q. Is there a particular failure mode that you're referring to?

A. Yes. I think it's DEW-3 and DEW-4.

Q. Okay. Could you walk us through DEW-3 and what this document says about it?

A. So DEW-3 and DEW-4 are the IDs assigned to this failure mode. And then the next column over for DEW-3 identifies the specific subcomponent of the dewar that is at question.

And here they're talking about the annular lines. And the annular lines are the fill port and the sense port lines. And that line that runs through -- they're called annular because they run through the annular space between the inner and outer vessel.

Q. Is that to say the annular line is just another way of referring to the fill line and the sense line?

A. That's correct.

And then in item function, they narrow it down specifically to just the fill line that goes from the outer vessel, where the nitrogen comes in, to the inner vessel. So they're talking specifically in DEW-3 about the fill line.

And then the next column over talks about the potential design failure mode; what could happen, what could break. And they talk about a crack or a leak in that particular line.

And then the next column over hones in on it just a little bit more as what would the cause be. And they talk about a failure of the weld, a weld line failure; precisely what we're looking at in Tank 4 and all the images we showed you of that

crack.

And then it was particularly interesting, the next column over talks about what could happen, what's the consequence from an engineering standpoint if you have that crack in the weld line. And that reads:

"Liquid draws into the vacuum space, expanding rapidly, causing the inner vessel implosion, total vacuum loss. Loss of function of the freezer."

So this, essentially, is something that was done prior to this incident, when these vessels were being manufactured and designed, that indicates what could happen if you had a weld line failure in the fill port weld. And the consequences are very similar to what we see here.

And then --

Q. So is this failure mode described by Chart in its own failure analysis consistent with what happened to Tank 4?

A. It is in my opinion, yes.

Q. How does the DEW-4 failure analysis compare to the DEW-3 failure analysis mode that you just described?

A. It's talking specifically about the inner vessel, and the reason being, it holds the liquid nitrogen. So that's the function of the inner vessel.

And, again, they talk about the potential failure mode as being a crack or a leak in the inner vessel. And then they hone in on weld line failure as a potential failure mode.

And then the effect of having a failure at a weld line in the inner vessel, again, is the liquid nitrogen drawing into the vacuum space, expanding and causing a collapse or implosion of the inner vessel. And, of course, prior to the implosion, you have a total loss of the vacuum in the vacuum space.

Q. Are there any other failure modes within this failure analysis from Chart that discuss an implosion of the inner vessel?

A. None that I could find. And I looked through the document fairly closely.

Q. Is there a failure mode akin to DEW-3 for the sense line?

A. No, there's not.

Q. Why do you think that is?

A. Uhm, as I was trying to explain earlier, the difference between the fill and the sense is the fill line has a liquid nitrogen coming from the supply tank down into the tank, and that cools that entire 26-inch length of fill line that's trapped or fixed between the two welds.

The sense line, on the other hand, never has nitrogen flowing into it. It only has nitrogen in the part of the sense line that's below the level of the nitrogen in the tank. So it's not subjected to the same type of thermal loading that the fill line is subjected to.

The fill line is taken from the equilibrium point, the point at which those two welds cool and freezes that line in

that 26-inch length down to the liquid nitrogen temperatures, the entire length of the 26 inches.

Q. Are these two failure modes within Chart's failure analysis that discuss inner vessel implosion, are both of those dependent on a crack first opening up from the -- in the inner vessel?

A. Yes.

Q. Could you take a look at DEW-0, the failure mode just a few above DEW-3 there.

What is this failure mode?

A. It's talking about a general failure of the dewar itself. And it talks about the function of the dewar.

Q. What is the immediate effect of the failure of the dewar as a whole?

A. The effect -- when you say "immediate effect of the failure of the dewar," you mean a leak? That's similar to what we've been discussing. And the immediate effect is loss of vacuum and loss of insulation.

So it's no longer doing what it was intended to do because it's no longer insulating, the liquid nitrogen, the eggs and the embryos from the ambient or outside air temperatures.

Q. So, essentially, the tank would not be able to hold the temperature that it was designed to hold?

A. It would result in the liquid nitrogen, depending on the nature of the vacuum failure, evaporating at a much higher rate

of evaporation than if the vacuum was intact.

Q. Dr. Kasbekar, Chart has stipulated that it manufactured Tank 4 in January of 2012.

Do you know whether these three DFMECA entries we've discussed were part of Chart's failure analysis at that time?

A. My understanding, based upon some documents Chart provided, indicated that they were in existence in 2012.

MS. ZEMAN: Your Honor, I'd like to read the RFA responses from Chart into the record. I hate to take up the time to do it. I'm wondering if we could just represent what the takeaway was.

THE COURT: Is there -- do they know what numbers you're referring to?

MS. ZEMAN: They should. It's in RFAs that were put forward as an exhibit. This is Exhibit 005, Chart's Answers to Plaintiffs' Requests for Admissions, Set 5.

THE COURT: So it's in evidence?

MS. ZEMAN: Correct.

THE COURT: All right. Yeah. What number?

MR. DUFFY: What number?

MS. ZEMAN: Request 14, Request 15, and Request 16.

MR. DUFFY: Please wait until we call it up.

MS. ZEMAN: What's that?

MR. DUFFY: Please wait until we call it up.

THE COURT: Go ahead.

BY MS. ZEMAN:

Q. So these three RFA responses essentially indicate that the three DFMECA modes that we've just discussed were all part of that documentation as of January 1st, 2012.

Is that consistent with your understanding, Dr. Kasbekar, that those modes existed in the documentation before Tank 4 was manufactured?

A. It is. That's my understanding.

Q. What does that DFMECA analysis and the timing of those entries within its failure analysis tell you about the Tank 4 failure on March 4th of 2018?

A. Well, it tells me that Chart's engineers were aware that you could have a crack in the areas that we just discussed, and they were --

MR. DUFFY: Objection. Relevance to the knowledge. It's not an element of the plaintiffs' claim.

THE COURT: Overruled.

THE WITNESS: Essentially, Chart's engineers had foreseen the possibility of these cracks occurring and the consequences of them occurring.

So their team of experts, with regard to this tank, were -- in their failure analysis, were able to tell that if you have a crack here, you're going to get an implosion and you're going to have a loss of vacuum.

And it shows me that, similar to my thought process, that

they know weld lines are of particular concern.

BY MS. ZEMAN:

Q. Would this failure analysis that we've looked at have been provided to PFC when it purchased Tank 4?

A. No. Not to my knowledge.

Q. You acquired a tank like Tank 4 as part of your investigation; correct?

A. I did.

Q. Did you receive any documentation like this?

A. Nothing like this. I received documentation, but this certainly was not part of it.

Q. You mentioned earlier that you worked with failure analysis documentation like this in other contexts.

Have you ever seen an instance where such documentation was provided to consumers or end users of a document -- of a product?

MR. DUFFY: Objection, Your Honor. There is no warnings claim in this case. I don't know why he's talking about giving internal documents to customers.

THE COURT: I think it's stipulated it was not given to Pacific Fertility. Is that right? It's not -- it's undisputed.

MR. DUFFY: Your Honor, it isn't relevant. There is no warnings claim.

THE COURT: Well, okay. Overruled.

Go ahead.

Well, I ruled with respect to a jury instruction, maybe. Is that what I ruled?

MS. ZEMAN: I think we've actually covered what I was hoping to communicate.

Could we look at Exhibit 208.

(Document displayed.)

BY MS. ZEMAN:

Q. Dr. Kasbekar, do you recognize this document?

A. I do.

Q. What is this?

A. It's an email from a Chart employee describing the tank implosion.

Q. Did you review this as part of your investigation of Tank 4?

A. I did.

Q. When did you first see this document?

A. I don't remember the exact date. I think it was pretty late in the process after we had done all of our inspections and completed a majority of my analysis and work.

Q. Could you read the second-to-last paragraph on the first page to the jury.

A. (Read:)

"As far as the vacuum failure, we suspect the impact caused gas to leak into the vacuum space and the immediate

vaporization of a liquid to a gas expansion caused a sudden increase in pressure that made the inner collapse."

Q. Is that paragraph significant to you in any way?

A. Well, it's certainly consistent with liquid nitrogen being able to cause the damage that we see ultimately in Tank 4. It supports my opinion that liquid nitrogen did enter into the vacuum space.

And it's also consistent with the DFMECA we were just discussing that describes that if liquid nitrogen enters through a crack into the vacuum space, you can have this type of damage.

MS. ZEMAN: We can close that exhibit.

BY MS. ZEMAN:

Q. Are you aware of any safety alerts regarding the implosion of cryogenic tanks?

A. Yes, I'm aware of a -- one from the UK, or England.

Q. What was -- was that -- was that safety alert significant to you in the course of this investigation?

A. It was one more piece of information that was consistent with my analysis and findings.

Q. What was significant about it to you?

A. Two things. It describes -- it's a much bigger tank that's used to store cryogenic fluids. But it talks about a failure of a weld in the area where the weld attaches the fill line, or cryogenic fluid line, to the tank due to thermal

contraction of the line.

And then the result is even more catastrophic than what we see here in terms of it not crumpling. The result is when liquid nitrogen gets into the vacuum space is it causes that tank to explode also.

Q. Is it your opinion with -- that Tank 4's fill port weld cracked and then some amount of liquid nitrogen entered the vacuum space, then expanded and caused the implosion that we see with the tank here?

A. I think that's eventually what happened is that the nitrogen migrated into there and ultimately expanded to the point to cause that level of deformation.

Q. Would the vacuum have been totally lost as soon as the crack opened?

A. Yes. I mean, maintaining a high vacuum is very difficult. I do have experience with that from my research in graduate school. Even a very, very small leak would result in you losing vacuum.

Q. So once the crack opened, would the tank still be maintaining insulative properties around the liquid nitrogen in the inner vessel?

A. It would be to a much, much lesser degree because a vacuum -- really, your primary insulation of that tank is a vacuum. You have that foil wrap which helps, but that's also designed to prevent radiative heat transfer.

So radiative is, for example, when the sun hits your skin. That's the reason it's a reflective foil. So the vast majority of the insulation would be gone and the liquid nitrogen would deplete more rapidly.

Q. From the moment that crack opened, would the liquid nitrogen that remained in Tank 4's inner vessel begin evaporating off much more quickly than it had been?

A. Yes.

Q. Dr. Kasbekar, you've described a failure mode for Tank 4 where the crack opened from the vacuum space under the inner vessel, and then an implosion occurred after that crack opened up.

Is it possible that the opposite happened; that is, that the implosion actually caused the crack?

A. Not in my opinion, it's not.

Q. What is your opinion based on?

A. It's based upon the physical evidence that I just went through with regard to the scanning electron micrographs and the nature of the cracked surface. That shows me really two things. One is, it's due to cyclic loading. The final rupture is due to monotonic loading; "mono" meaning signal. So it doesn't support it in that sense.

In addition, if this was due to the overload, the loads on the fitting would be the opposite of the thermal contraction. So because that tank is crumpling and trying to get shorter,

the bottom of the tank is actually being forced upwards. When it buckles, it causes those lines to push down on the fitting. And what that does is it causes a crack to open up at that six o'clock position not from the vacuum space side but from the inside of the tank.

And I believe that's eventually what happened, but that's not what caused the vacuum loss. It was a crack coming from the vacuum space at the root of the weld that caused the vacuum loss.

Q. Do you think the implosion of Tank 4 affected the crack that had already opened up at the fill port weld?

A. Yes, it absolutely did.

Q. How so?

A. Because, as I was trying to explain earlier, if we have -- if my fingertips are the vacuum space at the root of the weld, if we have a crack that opens in this direction, because when that tube contracts it pulls up on my fingertips, and then all of a sudden we have an implosion that pushes this up, that tube is now going to push down. And it's going to close the crack where it originally started, but it's going to open the crack on the inner side of the vessel. It's the opposite direction.

Q. If, in fact, the crack had been caused by the implosion, would you expect to see beach marks on the fractographic analysis?

A. Absolutely not.

Q. Would you expect to see rub marks on the fractographic analysis?

A. We could have some, but not the way we see it isolated primarily around the crack origin.

Q. What about secondary cracks?

A. I would not expect to see the level of secondary cracks that we have.

And the biggest thing I wouldn't expect to see is the beach marks pointing to an origin at the root of the weld.

MS. ZEMAN: Could we see slide 41.

(Photograph displayed.)

BY MS. ZEMAN:

Q. What is this image showing, Dr. Kasbekar?

A. So remember we talked earlier about pulling the fracture surfaces apart in a tensile test machine to separate them? And I said we could identify the part of the fracture that was from when we pulled the fracture apart, the laboratory-induced fracture.

Well, what these images show is, on the right side, B, this whole image is of the laboratory fracture. You can kind of see how pristine, how sharp the features are. That's fresh fracture surface from monotonic overloading. That's what it looks like.

A is the part of the fracture that was already there when we found this crack. This is what happened, in my opinion, to

cause the loss of vacuum. This is a field fracture.

What's important to note is both of these images are taken at the exact same magnification, 500X. So you can look at these for yourself. You don't need me, as an expert, to tell you they don't look the same. They look different.

And the reason they look different is the one on the left is due to progressive failure that occurred over time due to cyclic loading, and the one on the right is due to monotonic overload from us pulling it apart in the lab.

Q. And image A is the failure surface in Tank 4's weld; correct?

A. Yes. Image A is what happened and caused the loss of vacuum. Image B is a part of the weld that we tore apart in the lab.

Q. What does it mean to you to see evidence of both progressive and monotonic cracking on Tank 4's fill port weld?

A. It means it supports my opinion that the crack initiated at the root of the weld and progressed due to cyclic loading.

And it also supports the conclusion that the crack was affected by the final implosion. And that's not at all uncommon to see in failure analysis.

And one of the places we see things like that is in boiler explosions where a crack starts. And once that crack allows the hot water in the boiler to be exposed to atmospheric temperature or pressure, the water that wasn't boiling in the

boiler all of a sudden starts to boil and then the whole boiler explodes.

We have lots of fractures. We have lots of bent metal. We have parts of the fracture surface that occurred first that have been damaged by contacting other things.

So it's not uncommon in failure analysis to have the primary cause of the fracture and then other things that happened afterwards. And in this particular case, the root cause of the fracture -- no pun intended -- is a fracture, a crack, that initiated at the root of the weld that didn't match the design specifications.

Q. Would there have been any disadvantage to applying a full-penetration weld at that spot, that crack?

A. The only possible disadvantage is you have to be careful when welding thin materials. And it takes a talented welder or machine to do so effectively, because if you have too much heat, you'll burn right through it. I mean, you'll literally burn a hole through the sheet metal.

So the full-penetration weld, you need to be careful as to whether or not you could do that without burning holes through the sheet metal, which is one of the things -- one of the reasons I did some -- I had -- not me. I can weld, but not at this level. But I had a seasoned welder who's particularly good with these materials make weld passes on it. And he very quickly was able to do that.

We did have some instances of burn-through, as Mr. Duffy said, but that's not burn-through with holes going through. All that means is that you can see the -- some of the effect of the weld going through the metal. And you see that in Chart's tanks that they manufacture, too. If you look at the backside of the weld, you'll see where there's some bubbling of the metal on the backside of the weld.

Q. Does it harm the integrity of the tank to have a little bit of visible burn-through that you just described?

A. A little bit of burn-through is fine as long as it doesn't create a leak path. And that's something that, in my opinion, can be dealt with by an experienced welder, proper fit-up, proper materials.

THE COURT: Ms. Zeman, it's 1:30. I don't know if you only have a little bit with the witness or if we should break now.

MS. SHARP: I think it would be good to break now. He'll have to be back tomorrow for cross anyway.

THE COURT: So, members of the jury, as we said, we will conclude at 1:30. Please remember not to discuss the case at all. We'll see you tomorrow morning.

And I think, again, Ms. Means has arranged for you to have coffee and pastries for your planning purposes.

Thank you very much.

(Jury out at 1:30 p.m.)

THE COURT: Thank you, Doctor. You may step down. But you are not excused.

Okay. So I know I have to go through those deposition excerpts. Who do you intend to put on tomorrow, just so I know to prioritize?

MS. ZEMAN: I believe we are starting with Adams. I don't have the list in my head, exactly, but I think Adams would be the first, and then Eubanks. Either Brooks or Eubanks.

Depending on the cuts, I think we could potentially get through a good chunk of them tomorrow. If it does involve using most of the counter-designations from Chart, then that would change that analysis quite a bit though.

THE COURT: Okay. All right. Adams, Eubanks. And who was the third.

MS. ZEMAN: Brooks.

THE COURT: Brooks. All right. Okay. Anything else we should discuss before we leave?

MS. ZEMAN: It's possible we could get through Junnier as well.

THE COURT: I'll see if I can get through them all, but in case I can't, I just wanted to know --

MS. ZEMAN: Could we possibly address the Gonzalez testimony?

THE COURT: Yes. So my indication is to allow it to

come in given that you thought that those witnesses were going to be live, but Chart's not. They have the right not to call them live, but that's a changed circumstance.

Since it's just depo testimony, there's no prejudice because Chart doesn't have to prepare for any additional witness.

MS. ZEMAN: We appreciate that.

THE COURT: If Chart wants to be heard.

MR. LOTHSON: Your Honor, we filed a brief on this last night. I'm sure you read it. I wouldn't add anything to the record on that.

THE COURT: All right. Thank you. So we'll allow that. But he would come after those four?

MS. ZEMAN: Correct, after those 4.

THE COURT: Four.

All right. Brief, in any event.

MS. ZEMAN: Correct.

MR. LOTHSON: Your Honor, I hesitate --

THE COURT: No, it's okay. Please, I'm sorry I raised my voice. Don't hesitate.

MR. LOTHSON: Sorry, I'm a little taller than this microphone. Let me pull it up here.

THE COURT: That's a good idea.

MR. LOTHSON: So there were trial exhibits, as well, that were other occurrence stuff, and things like that, that

haven't been ruled on that are related to the deposition designations. I assume you can work through those, as well, in conjunction?

THE COURT: Those are the ones identified in the brief.

MR. LOTHSON: They are identified in plaintiffs' brief. And then we had a statement on our objections to them as well.

THE COURT: Yes, I'll rule on all those so we'll have that done.

MR. LOTHSON: Thank you, Your Honor.

MR. DUFFY: Thank you, Your Honor.

MS. ZEMAN: One more question. Would it be possible tomorrow to have the jury instruction regarding RFAs read to the jury to let them know the significance of those?

It's Ninth Circuit 2-point --

THE COURT: I don't know -- are you going to be using them again?

MS. ZEMAN: It is possible.

THE COURT: I mean, why don't I do it at a time when they come up begin.

MS. ZEMAN: That's fine.

THE COURT: I do intend, before the depositions are started, to read into the record the instruction about how deposition testimony should be treated the same as live

testimony.

MS. ZEMAN: Thank you.

THE COURT: I'll do that at the time.

MR. RINGEL: Your Honor, also, if we could get some kind of indication of what the testimony is going to be on Wednesday as well.

MS. ZEMAN: I think we have a question regarding -- on one of the RFAs that we will probably use tomorrow, there is a partial objection or an objection that is answered subject to the objection. When we read it into the record, will we need to read the objection as well?

THE COURT: Well, what -- it's Exhibit 5?

MS. ZEMAN: It may not be 5. It may be 4. I think there are two sets of RFAs that we referred to with Dr. Kasbekar. So it would either be Exhibit 4 or Exhibit 5.

THE COURT: All right. So which one? Let's just look at it now. I don't think there's any point -- well, I don't know.

MS. ZEMAN: An example would be in Exhibit 4. Request 11, where the answer, you know, includes an objection that then ends with "as limited by, subject to, and without waiving the foregoing objection, admitted."

THE COURT: I think it's just admitted.

MS. ZEMAN: Correct. That's an example.

MR. LOTHSON: There is an objection related to

feasibility.

THE COURT: Right. But if you couldn't answer it, then you didn't have to answer it. But Chart did answer it, so I don't know why it wouldn't be -- it's admitted. Chart admitted it was feasible.

And I guess the plaintiffs will argue what feasible means, and chart could argue that it interpreted it as something else because all it is is admitting it was feasible without definition, I guess. I mean, I guess -- but the exhibit itself is in evidence.

So the question Ms. Zeman has is, does she have to read the objection? I would say, no, you don't have to read the objection. However, the jury will have it. And Chart can do whatever they want with it because the objection will be given to the jury.

MS. ZEMAN: Of course.

THE COURT: All right.

MS. ZEMAN: Thank you.

THE COURT: Chart wanted to know, after tomorrow, when are you going to tell them who your witnesses are?

MS. SHARP: We can disclose now we plan to call Dr. Conaghan on Wednesday, after Dr. -- sorry after the Chart depositions are played. Dr. Conaghan.

THE COURT: After all --

MS. SHARP: Of course, when that happens will depend

on how Your Honor rules about the sequencing of how the depositions are played.

THE COURT: Okay. All right.

MR. LOTHSON: Your Honor, one other minor item related to exhibits in general.

There has been a lot of exhibits that have confidentiality stamps or attorneys' eyes only. I don't think it's a huge issue with the jury seeing them right now, but perhaps down the line -- I'm not saying we go back and redact all of those right, now but those are called extracurricular information that's not a part of the native document. Perhaps maybe an instruction from the Court, once the jury takes exhibits back, however you plan to handle that. But I would like to note that for the record.

THE COURT: Sure. I mean, why don't you discuss it. When I do my final instructions, I can say something to the jury that there might be -- you know, material is sometimes admitted for the purposes of the lawsuits, but they're confidential material, so it was shown to the jury, and that they were added after. Shouldn't infer anything from it, right, one way or the other. Other than, I suppose, they may want them to keep it confidential.

MR. LOTHSON: Well, once they're in open court and made an exhibit, I don't think that they have confidentiality anymore.

I think it's the connotation that goes with something being classified as confidential or attorneys' eyes only. If the juror were to think, oh, that was how it left Chart, when in fact that's not true at all, there could be a negative association with that.

THE COURT: Sure. If you want to work on something to show to the plaintiffs, even at the time that something is introduced in trial, I'm happy to give that instruction.

MR. LOTHSON: Thank you, Your Honor.

THE COURT: Okay. We'll see you tomorrow, at 8:00 a.m. I'll try to get something out by this evening.

(Counsel thank the Court.)

(At 1:39 p.m. the proceedings were adjourned, to resume on Tuesday, May 25, 2021, at 8:00 a.m.)

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CERTIFICATE OF REPORTERS

We certify that the foregoing is a correct transcript from the record of proceedings in the above-entitled matter.

DATE: Monday, May 24, 2021

Marla Knox

Marla F. Knox, CSR, RMR, CRR
U.S. Court Reporter

Katherine Sullivan

Katherine Powell Sullivan, CSR #5812, RMR, CRR
U.S. Court Reporter